

AVAX KYOCERA

Multilayer Ceramic Chip Capacitor

AVX KYOCERA

Ceramic Chip Capacitors

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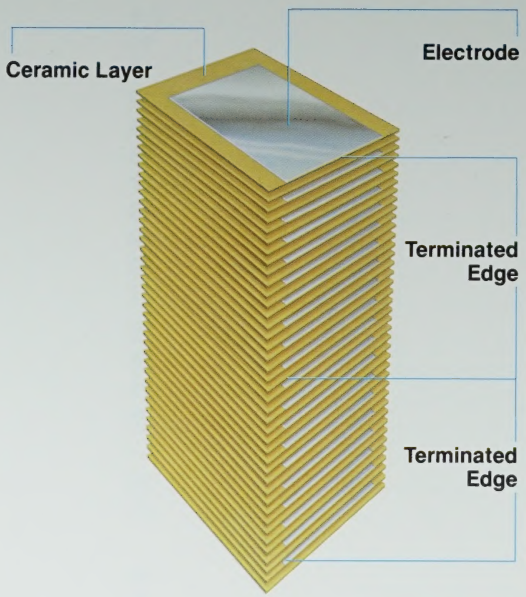
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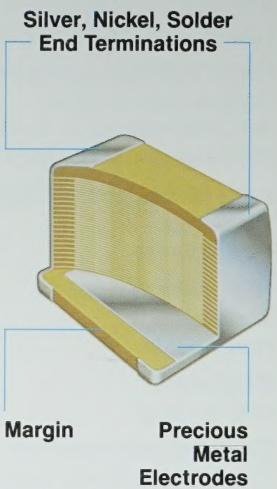
AVX KYOCERA

MLC Chip Capacitors



Terminations

- NiGuard: nickel as the solder barrier
- Leach resistance to 90 seconds at 260°C
- Solder plated for dimensional control
- Tin/lead solder outer coating is standard



AVX KYOCERA

How to Order

Part Number Explanation

EXAMPLE: 08051A101JATMA

0805 — **Size** (L″ x W″)
0504
0805
1005
0907
1206
1505
1210
1805
1808
1812
1825
2321
2225
3640

1 — **Voltage**
16V = Y
25V = 3
50V = 5
100V = 1
200V = 2
500V = 7
600V = C
1000V = A
1500V = S
2000V = G
2500V = W
3000V = H
4000V = J
5000V = K

A — **Dielectric**
NPO = A
X7R = C
Z5U = E
Y5V = G
Special = T

101 — **Capacitance Code**
(2 significant digits + no. of zeros)**
Examples:
10 pF = 100
100 pF = 101
1,000 pF = 102
22,000 pF = 223
220,000 pF = 224
1 μF = 105

J — **Capacitance Tolerance**
C = ±.25 pF‡
D = ±.50 pF‡
F = ±1%
G = ±2%
J = ±5%
K = ±10%
M = ±20%
Z = [+80, -20]%
P = +100%, -0%

A — **Failure Rate**
A = Not Applicable

T — **Terminations**
NiGuard®
Standard:
T = Plated Ni and Solder
Specials:
7 = Plated Ni Gold Plated
Pd/Ag
Standard:
1 = Pd/Ag
Others
Consult AVX

M — **Marking Packaging**
M = 7″ Reel Embossed Tape/Marked
N = 7″ Reel Paper Tape/Marked
R = 13″ Reel Embossed Tape/Marked
S = 13″ Reel Paper Tape/Marked
1 = 7″ Reel Embossed Tape/Unmarked
2 = 7″ Reel Paper Tape/Unmarked
3 = 13″ Reel Embossed Tape/Unmarked
4 = 13″ Reel Paper Tape/Unmarked
B = Bulk/Marked
9 = Bulk/Unmarked

A — **Special Code**
A = Standard
T = .026″ Max. Thk
S = .022″ Max. Thk
R = .018″ Max. Thk
P = .015″ Max. Thk

‡ C&D tolerances from 1.0 pF to 9.1 pF
** For values below 10 pfd, use "R" in place of decimal point, e.g., 9.1 pfd = 9R1.

Chip MLC Capacitor Cross Reference

AVX "Old" Part Number to AVX/Kyocera Part Number

	Style/Size	Voltage	TC	CAP	TOL	F.R.	Term.	Thick-ness	Packaging Marking	Special Code
AVX "Old" Part Number:	0805	1	A	101	J	A	T	050*	M	
AVX/Kyocera Part Number:	0805	1	A	101	J	A	T		M	A

AVX/Raleigh to AVX/Kyocera

	Style/Size	Voltage	TC	CAP	TOL	F.R.	Term.	Packaging Marking	Special Code
AVX/Raleigh Part Number:	CC0805		C0G	101	J	050	L	R	
AVX/Kyocera Part Number:	0805	5	A	101	J	A	T	M	A

STYLE AND SIZE:

Standard EIA Codes

VOLTAGE:

	AVX/RALEIGH	AVX/KYOCERA
50	050	5
100	100	1
200	200	2
500	500	7

TEMPERATURE CHARACTERISTIC:

	AVX/RALEIGH	AVX/KYOCERA
NPO	C0G	A
X7R	X7R	C
Z5U	Z5U	E

CAP AND TOLERANCE: STD. EIA CODES

PACKAGING-LEADS:

	AVX/RALEIGH	AVX/KYOCERA
Bulk	B	9
Tape & Reel	R	M

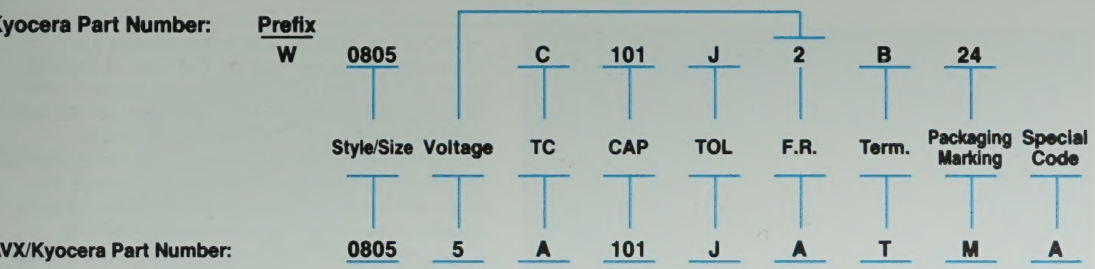
TERMINATIONS:

	AVX/RALEIGH	AVX/KYOCERA
Ni/Sn/Pb	L	T

*Note: Thickness field has been eliminated.

Chip MLC Capacitor Cross Reference

Kyocera to AVX/Kyocera



STYLE AND SIZE:

Standard EIA Codes

KYOCERA PREFIX CODES:

These codes prefix all Kyocera part numbers, and are defined as follows:

Code	Definition
K	Commercial chip capacitor manufactured in Japan.
W	Commercial chip capacitor manufactured in Vancouver, WA.
T	Ultra thin decoupling chip capacitor - .026 max. T (Re: AVX BitGuard type).
R	High reliability screen chip capacitor. Any item requiring 100% burn-in, or any special quality/conformance testing that is more suitable for processing by the reliability testing lab at VCP.
D	Special design for automotive applications.

VOLTAGE:

	KYOCERA	AVX/KYOCERA
16	8	Y
25	1	3
50	2	5
100	3	1
200	4	2
300	5	—
400	6	—
500	7	7

TEMPERATURE CHARACTERISTIC:

	KYOCERA	AVX/KYOCERA
NPO	C	A
BX	B	X
X7R	X	C
Z5U	Z	E
Y5V	Y	G
N150	P	—
N220	R	—
N330	S	—
N470	T	—
N750	U	—
+300/-1000	L	—

CAP AND TOLERANCE: STD. EIA CODES

PACKAGING-LEADS:

	KYOCERA	AVX/KYOCERA
Special	0	—
T/R 13" reel, embossed	1	R
T/R 13" reel, paper	2	S
Standard bulk	3	B
T/R 7" reel, embossed	4	M
T/R 7" reel, paper	5	N
Single layer waffle pack	6	—
Multilayer waffle pack	7	—
T/R 7" reel, pun. plastic	8	8
T/R 13" reel, pun. plastic	9	—

TERMINATIONS:

	KYOCERA	AVX/KYOCERA
Nickel Barrier/Sn-Pb Finish (Plated)	B	T
Nickel Barrier/Sn Finish (Plated)	N	Q
Nickel Barrier/Gold Finish (Plated)	—	7
PdAg	P	1

MARKING STYLE:

	KYOCERA	AVX/KYOCERA
No Marking	0	1,2,3,4
Single Character Color Code	1	—
2-Digit Alphanumeric	2	M,N,R,S
Special	3	—

AVX KYOCERA

NPO Dielectric
General Specifications



NPO (C0G) chip components meet long term capacitance stability characteristics of critical applications.

For special designs, consult AVX/Kyocera.

NPO is the most popular formulation of the "temperature-compensating," EIA Class I ceramic materials. Modern NPO formulations contain neodymium, samarium and other rare earth oxides and have dielectric constants between 30 and 80.

NPO ceramics offer one of the most stable capacitor dielectrics available. Capacitance change with temperature is 0 ±30ppm/°C which offers considerably less change at ±0.3% Δ C from -55°C to +125°C than other types of dielectrics at ±2%. Capacitance drift or hysteresis for NPO ceramics is negligible at less than ±0.05% versus up to ±2% for films. Typical capacitance change with life is less than ±0.1% for NPOs, one-fifth that shown by most other dielectrics. NPO formulations show no aging characteristics.

The NPO formulation usually has "Qs" in excess of 1000 and show little capacitance or "Q" changes with frequency. Their dielectric absorption is typically less than 0.6% which is similar to mica and most films.

Capacitance Range
0.5 pF to .027 μF (1.0 Vrms, 1kHz, for ≦ 100 pF use 1 MHz)

Capacitance Tolerances
±.25 pF, ±.5 pF, ±1%, ±2%, ±5%, ±10%, ±20%
For values less than 10 pF, tightest tolerance available is ±0.25 pF ("C").

Operating Temperature Range
-55°C to +125°C

Temperature Characteristic
0 ± 30 ppm/°C

Voltage Ratings
200, 100 & 50 VDC (+125°C)

Dissipation Factor
0.1% max. (+25°C and +125°C); 1.0 Vrms, 1 MHz for values ≦ 100 pF, and 1kHz for values > 100 pF

Insulation Resistance (+25°C, RVDC)
100,000 megohms min. or 1000 ohm-Farads min., whichever is less

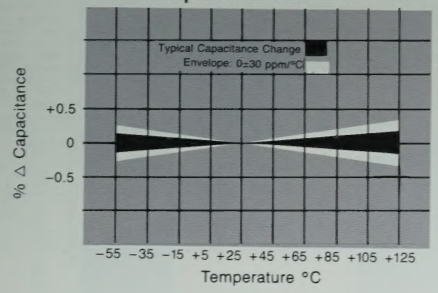
Insulation Resistance (+125°C, RVDC)
10,000 megohms min. or 100 ohm-Farads min., whichever is less

Dielectric Strength
250% of rated voltage

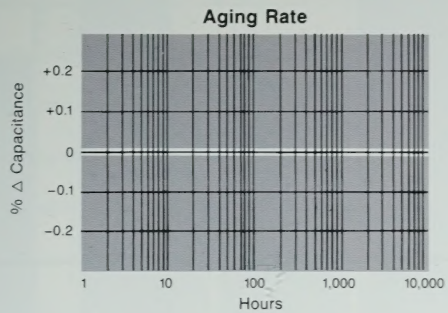
AVX KYOCERA

NPO Dielectric
Typical Characteristic Curves

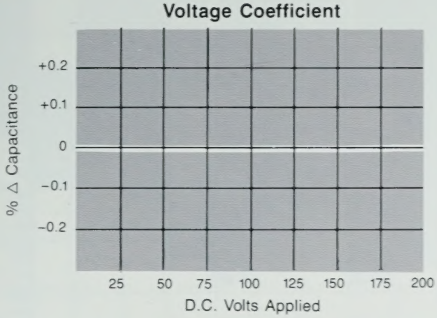
Temperature Coefficient



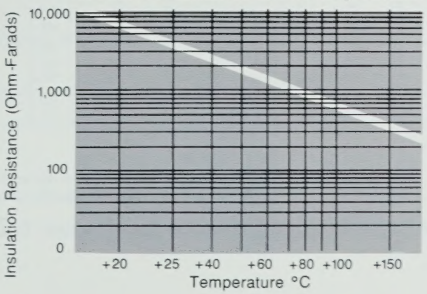
Aging Rate



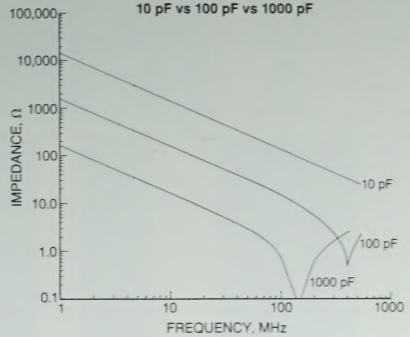
Voltage Coefficient



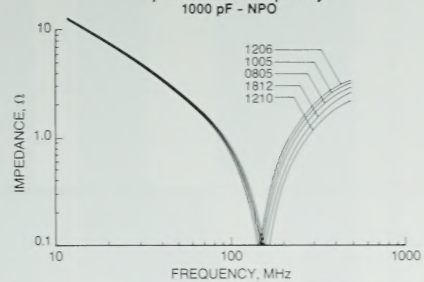
Insulation Resistance vs. Temperature



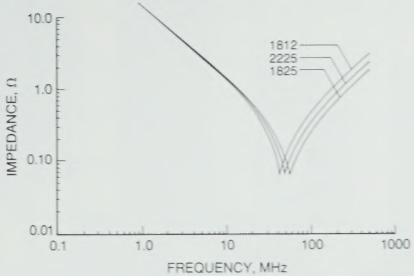
Impedance vs Frequency
0805 - NPO
10 pF vs 100 pF vs 1000 pF



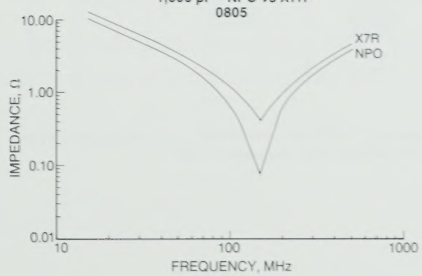
Impedance vs Frequency
1000 pF - NPO



Impedance vs Frequency
10,000 pF - NPO



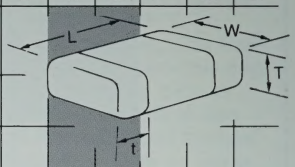
Impedance vs Frequency
1,000 pF - NPO vs X7R
0805



NPO Dielectric

Preferred Sizes are Shaded

SIZE		0504			0603		0805			1005			0907		1206			1505		
(L) Length	MM (in.)	1.27 ± .25 (.050 ± .010)			1.60 ± .15 (.063 ± .006)		2.01 ± 0.2 (.079 ± .008)			2.41 ± .25 (.095 ± .010)			2.29 ± .25 (.090 ± .010)		3.20 ± 0.2 (.126 ± .008)			3.81 ± .25 (.150 ± .010)		
(W) Width	MM (in.)	1.02 ± .25 (.040 ± .010)			.81 ± .15 (.032 ± .006)		1.25 ± 0.2 (.049 ± .008)			1.27 ± .25 (.050 ± .010)			1.78 ± .25 (.070 ± .010)		1.60 ± 0.2 (.063 ± .008)			1.27 ± .25 (.050 ± .010)		
(T) Thickness	MM (in.)	1.02 (.040)			1.02 (.040)		1.27 (.050)			1.27 (.050)			1.27 (.050)		1.27 (.050)			1.27 (.050)		
(t) Terminal	MIN. MAX.	.12 (.005) .38 (.015)			.25 (.010) .51 (.020)		.25 (.010) .71 (.028)			.25 (.010) .76 (.030)			.25 (.010) .76 (.030)		.25 (.010) .71 (.028)			.25 (.010) .76 (.030)		
WVDC		50	100	200	50	100	50	100	200	50	100	200	50	100	50	100	200	50	100	200
Cap. (pF)	0.5 1.0 1.2 1.5	■	■	■		■		■	■		■	■				■	■			
	1.8 2.2 2.7	■	■	■		■		■	■		■	■				■	■			
	3.3 3.9 4.7	■	■	■		■		■	■		■	■				■	■			
	5.6 6.8 8.2	■	■	■		■		■	■		■	■				■	■			
	10 12 15	■	■	■		■		■	■		■	■		■		■	■		■	■
	18 22 27	■	■	■		■		■	■		■	■		■		■	■		■	■
	33 39 47	■	■	■		■		■	■		■	■		■		■	■		■	■
	56 68 82	■	■			■		■	■		■	■		■		■	■		■	■
	100 120 150	■	■			■		■	■		■	■		■		■	■		■	■
	180 220 270	■			■	■		■	■		■	■		■		■	■		■	■
	330 390 470	■						■						■		■	■		■	■
	560 680 820						■			■	■			■		■	■	■	■	
	1000 1200 1500						■			■			■	■		■		■		
	1800 2200 2700												■		■	■				
	3300 3900 4700														■					
	5600 6800 8200																			
Cap. (μF)	.010 .012 .015																			
	.018 .022 .027																			
	.033 .039																			



NOTES:
- Dimensions are in millimeters, dimensions in parenthesis are in inches.
- **For higher voltage chips, see pages 22-25.**

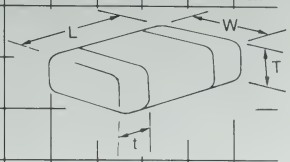
AVX KYOCERA

NPO Dielectric

Preferred Sizes are Shaded

SIZE		1805**	1210	1808**	1812**	1825**	2321**	2225**
(L) Length	MM (in.)	4.57 ± .25 (.180 ± .010)	3.20 ± 0.2 (.126 ± .008)	4.57 ± .25 (.180 ± .010)	4.50 ± 0.3 (.177 ± .012)	4.50 ± 0.3 (.177 ± .012)	5.84 ± .25 (.230 ± .010)	5.72 ± .25 (.225 ± .010)
(W) Width	MM (in.)	1.27 ± .25 (.050 ± .010)	2.49 ± 0.2 (.098 ± .008)	2.03 ± .25 (.080 ± .010)	3.20 ± 0.2 (.126 ± .008)	6.40 ± 0.3 (.252 ± .012)	5.33 ± .25 (.210 ± .010)	6.35 ± .25 (.250 ± .010)
(T) Thickness	MM (in.)	1.27 (.050)	1.52 (.060)	1.52 (.060)	1.52 (.060)	1.52 (.060)	1.52 (.060)	1.52 (.060)
(t) Terminal	MIN. MAX.	.25 (.010) 1.02 (.040)	.25 (.010) .71 (.028)	.25 (.010) 1.02 (.040)	.25 (.010) .76 (.030)	.25 (.010) .76 (.030)	.25 (.010) 1.02 (.040)	.25 (.010) 1.02 (.040)

WVDC		50	100	200	50	100	200	50	100	200	50	100	200	50	100	200	50	100	200	50	100	200
Cap. (pF)	1.0 1.2 1.5																					
	1.8 2.2 2.7																					
	3.3 3.9 4.7																					
	5.6 6.8 8.2																					
	10 12 15																					
	18 22 27																					
	33 39 47																					
	56 68 82																					
	100 120 150																					
	180 220 270																					
	330 390 470																					
	560 680 820																					
	1000 1200 1500																					
	1800 2200 2700																					
	3300 3900 4700																					
	5600 6800 8200																					
Cap. (μF)	.010 .012 .015																					
	.018 .022 .027																					
	.033 .039																					



NOTES:
- Dimensions are in millimeters, dimensions in parenthesis are in inches.
- **For higher voltage chips, see pages 22-25.**

**** IR and vapor Phase soldering only recommended.**

X7R Dielectric
General Specifications



X7R dielectric chip usage covers the broad spectrum of industrial applications where known changes in capacitance due to applied voltages are acceptable.

X7R formulations are called "temperature-stable" ceramics and fall into EIA Class II materials. X7R is the most popular of these intermediate dielectric-constant materials. Its temperature variation of capacitance is within ±15% from -55°C to +125°C. This capacitance change is non-linear.

Capacitance for X7R varies under the influence of electrical operating conditions such as voltage and frequency. It also varies with time, approximately 1% Δ C per decade of time, representing about 5% change in ten years.

For special designs, consult AVX/Kyocera.

Capacitance Range
100 pF to 1.0 μF (1.0 Vrms, 1kHz)

Capacitance Tolerances
±5%, ±10%, ±20%, +80 -20%

Operating Temperature Range
-55°C to +125°C

Temperature Characteristic
±15% (0 VDC)

Voltage Ratings
25, 50, 100 VDC (+125°C)

Dissipation Factor
2.5% max. (+25°C, 1.0 Vrms, 1kHz)

Insulation Resistance (+25°C, RVDC)
100,000 megohms min. or 1000 ohm-Farads min., whichever is less

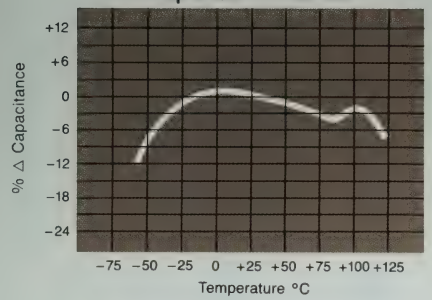
Insulation Resistance (+125°C, RVDC)
10,000 megohms min. or 100 ohm-Farads min., whichever is less

Aging Rate
<1% per decade hour

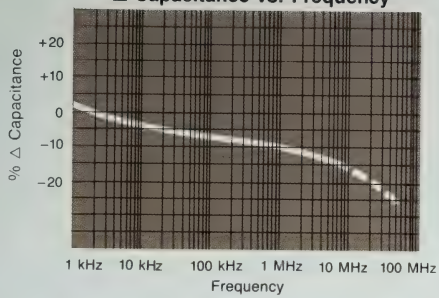
Dielectric Strength
250% of Rated VDC

X7R Dielectric
Typical Characteristic Curves

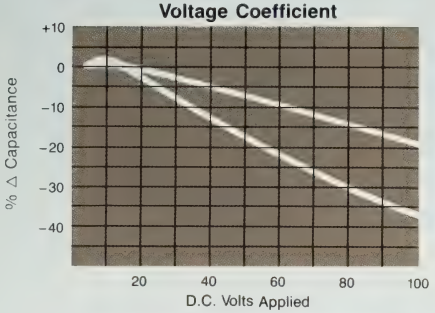
Temperature Coefficient



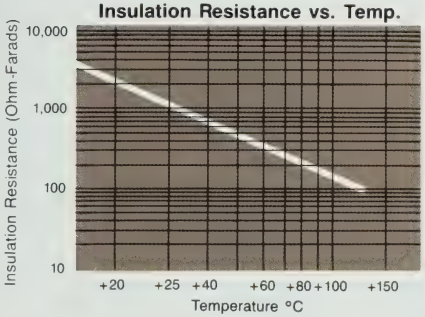
Δ Capacitance vs. Frequency



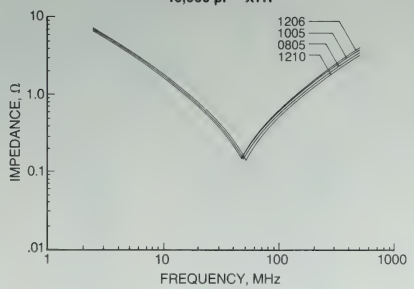
Voltage Coefficient



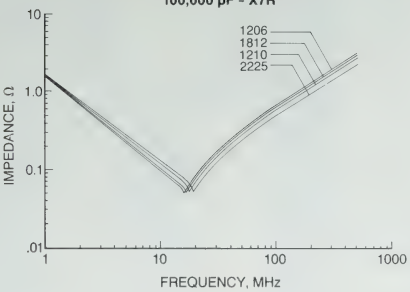
Insulation Resistance vs. Temp.



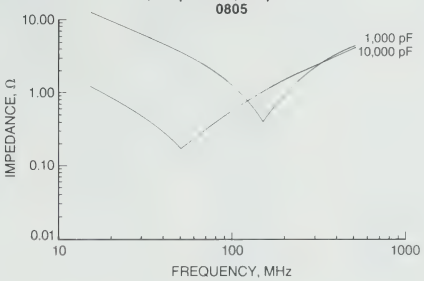
Impedance vs Frequency
10,000 pF - X7R



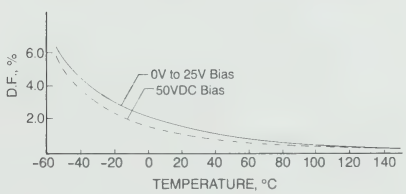
Impedance vs Frequency
100,000 pF - X7R



Impedance vs Frequency
1,000 pF vs 10,000 pF - X7R
0805



Variation of D.F. with Temperature for MLCs
(50VDC, 0.1 μF, X7R)



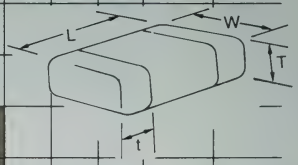
AVX KYOCERA

MAXI-CHIP

X7R Dielectric

Preferred Sizes are Shaded

SIZE		0504		0603			0805			1005			0907			1206			1505	
(L) Length	MM	1.27 ± .25		1.60 ± .15			2.01 ± 0.2			2.41 ± .25			2.29 ± .25			3.20 ± 0.2			3.81 ± .25	
	(in.)	(.050 ± .010)		(.063 ± .006)			(.079 ± .008)			(.095 ± .010)			(.090 ± .010)			(.126 ± .008)			(.150 ± .010)	
(W) Width	MM	1.02 ± .25		.81 ± .15			1.25 ± 0.2			1.27 ± .25			1.78 ± .25			1.60 ± 0.2			1.27 ± .25	
	(in.)	(.040 ± .010)		(.032 ± .006)			(.049 ± .008)			(.050 ± .010)			(.070 ± .010)			(.063 ± .008)			(.050 ± .010)	
(T) Thickness	MM	1.02		1.02			1.27			1.27			1.27			1.27			1.27	
	(in.)	(.040)		(.040)			(.050)			(.050)			(.050)			(.050)			(.050)	
(t) Terminal	MIN.	.12 (.005)		.25 (.010)			.25 (.010)			.25 (.010)			.25 (.010)			.25 (.010)			.25 (.010)	
	MAX.	.38 (.015)		.51 (.020)			.71 (0.28)			.76 (.030)			.76 (.030)			.71 (.028)			.76 (.030)	
WVDC		50	100	25	50	100	25	50	100	25	50	100	25	50	100	25	50	100	50	100
Cap. (pF)	100																			
	120																			
	150																			
	180																			
	220																			
	270																			
	330																			
	390																			
	470																			
	560																			
	680																			
	820																			
	1000																			
	1200																			
	1500																			
	1800																			
	2200																			
	2700																			
	3300																			
	3900																			
	4700																			
	5600																			
	6800																			
	8200																			
Cap. (μF)	.010																			
	.012																			
	015																			
	018																			
	022																			
	027																			
	033																			
	039																			
	047																			
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	82																			
	10																			



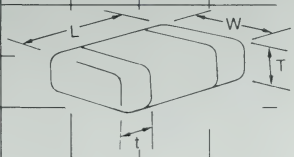
NOTES:
- Dimensions are in millimeters, dimensions in parenthesis are in inches.
- **For higher voltage chips, see pages 22-25.**

AVX KYOCERA

X7R Dielectric

Preferred Sizes are Shaded

SIZE		1805**		1210			1808**			1812**		1825**		2321**		2225**	
(L) Length	MM (in.)	4.57 ± .25 (.180 ± .010)		3.20 ± 0.2 (.126 ± .008)			4.57 ± .25 (.180 ± .010)			4.50 ± 0.3 (.177 ± .012)		4.50 ± 0.3 (.177 ± .012)		5.84 ± .25 (.230 ± .010)		5.72 ± .25 (.225 ± .010)	
(W) Width	MM (in.)	1.27 ± .25 (.050 ± .010)		2.49 ± 0.2 (.098 ± .008)			2.03 ± .25 (.080 ± .010)			3.20 ± 0.2 (.126 ± .008)		6.40 ± 0.3 (.252 ± .012)		5.33 ± .25 (.210 ± .010)		6.35 ± .25 (.250 ± .010)	
(T) Thickness	MM (in.)	1.27 (.050)		1.52 (.060)			1.52 (.060)			1.52 (.060)		1.52 (.060)		1.52 (.060)		1.52 (.060)	
(t) Terminal	MIN. MAX.	.25 (.010) 1.02 (.040)		.25 (.010) .71 (.028)			.25 (.010) 1.02 (.040)			.25 (.010) .76 (.030)		.25 (.010) .76 (.030)		.25 (.010) 1.02 (.040)		.25 (.010) 1.02 (.040)	
WVDC		50	100	25	50	100	25	50	100	50	100	50	100	50	100	50	100
Cap. (pF)	100 120 150																
	180 220 270																
	330 390 470																
	560 680 820																
	1000 1200 1500																
	1800 2200 2700																
	3300 3900 4700																
	5600 6800 8200																
Cap. (μF)	.010 .012 .015																
	.018 .022 .027																
	.033 .039 .047																
	.056 .068 .082																
	.10 .12 .15																
	.18 .22 .27																
	.33 .39 .47																
	.56 .68 .82																
	1.0 1.2																



NOTES:
- Dimensions are in millimeters, dimensions in parenthesis are in inches.
- **For higher voltage chips, see pages 22-25.**

**** IR and Vapor phase soldering only recommended.**

Z5U Dielectric
General Specifications



Z5U dielectric is utilized where highest capacitance density is required.

Z5U formulations are "general-purpose" ceramics which are meant primarily for use in limited temperature applications where small size and cost are important. They provide the highest capacitance possible in a given size for the three most popular ceramic formulations. They show wide variations in capacitance under influence of environmental and electrical operating conditions. Their aging rate is approximately 5% per decade or 25% drop in ten years.

Despite their capacitance instability, Z5U formulations are very popular because of their small size, low ESL, low ESR and excellent frequency response. These features are particularly important for decoupling application where only a minimum capacitance value is required.

For special designs, consult AVX/Kyocera.

Capacitance Range
0.01 μF to 2.7 μF (.5 Vrms, 1kHz)

Capacitance Tolerances
±20%, +80 -20%, +100 -0%

Operating Temperature Range
+10°C to +85°C

Temperature Characteristic
+22% to -56% max. within operating temperature

Voltage Ratings
50 & 25 VDC (+85°C)

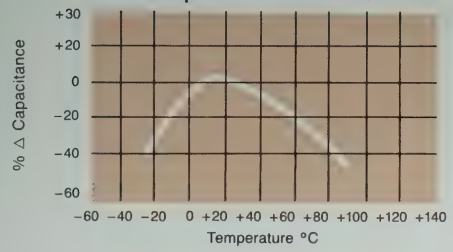
Dissipation Factor
3% max. (+25°C, .5 Vrms, 1kHz)

Insulation Resistance (+25°C, RVDC)
10,000 megohms min. or 1000 ohm-Farads min., whichever is less

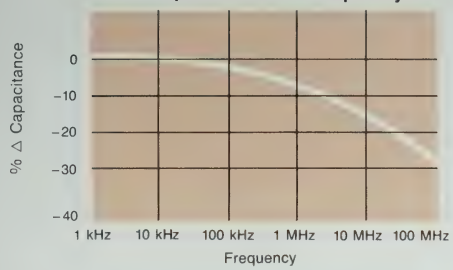
Dielectric Strength
150% of rated VDC

Z5U Dielectric
Typical Characteristic Curves

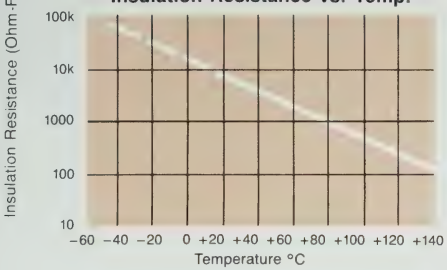
Temperature Coefficient



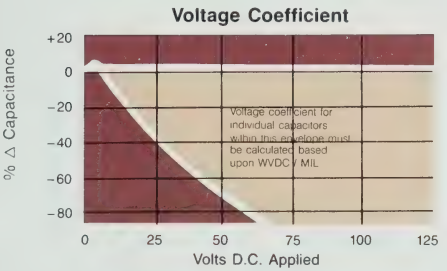
Δ Capacitance vs. Frequency



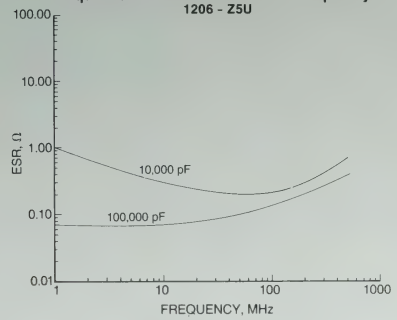
Insulation Resistance vs. Temp.



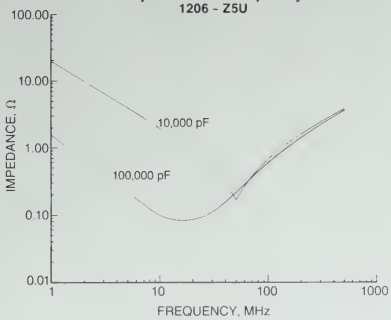
Voltage Coefficient



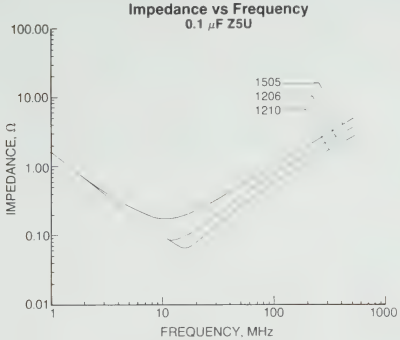
Equivalent Series Resistance vs Frequency
1206 - Z5U



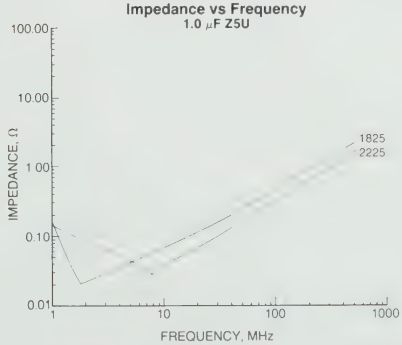
Impedance vs Frequency
1206 - Z5U



Impedance vs Frequency
0.1 μF Z5U



Impedance vs Frequency
1.0 μF Z5U



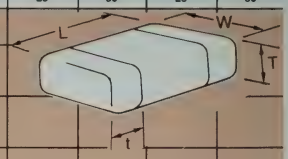
AVX KYOCERA

MAXI-CHIP

Z5U Dielectric

Preferred Sizes are Shaded

SIZE		0504		0603		0805		1005		0907		1206		1505**	
(L) Length	MM (in.)	1.27 ± .25 (.050 ± .010)		1.60 ± .15 (.063 ± .006)		2.01 ± 0.2 (.079 ± .008)		2.41 ± .25 (.095 ± .010)		2.29 ± .25 (.090 ± .010)		3.20 ± 0.2 (.126 ± .008)		3.81 ± .25 (.150 ± .010)	
(W) Width	MM (in.)	1.02 ± .25 (.040 ± .010)		.81 ± .15 (.032 ± .006)		1.25 ± 0.2 (.049 ± .008)		1.27 ± .25 (.050 ± .010)		1.78 ± .25 (.070 ± .010)		1.60 ± 0.2 (.063 ± .008)		1.27 ± .25 (.050 ± .010)	
(T) Thickness	MM (in.)	1.02 (.040)		1.02 (.040)		1.27 (.050)		1.27 (.050)		1.27 (.050)		1.27 (.050)		1.27 (.050)	
(t) Terminal	MIN. MAX.	.12 (.005) .38 (.015)		.25 (.010) .51 (.020)		.25 (.010) .71 (.028)		.25 (.010) .76 (.030)		.25 (.010) .76 (.030)		.25 (.010) .71 (.028)		.25 (.010) .76 (.030)	
WVDC		25	50	25	50	25	50	25	50	25	50	25	50	25	50
Cap. (μF)	.010 .012														
	.015 .018 .022														
	.027 .033 .039														
	.047 .056 .068														
	.082 .10 .12														
	.15 .18 .22														
	.27 .33 .39														
	.47 .56 .68														
	.82 1.0 1.5														
	1.8 2.2 2.7														



NOTES:
- Dimensions are in millimeters, dimensions in parenthesis are in inches.

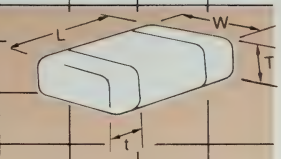
**** IR and Vapor phase soldering only recommended.**

AVX KYOCERA

Z5U Dielectric

Preferred Sizes are Shaded

SIZE		1805**		1210		1808**		1812**		1825**		2321**		2225**	
(L) Length	MM (in.)	4.57 ± .25 (.180 ± .010)		3.20 ± 0.2 (.126 ± .008)		4.57 ± .25 (.180 ± .010)		4.50 ± 0.3 (.177 ± .012)		4.50 ± 0.3 (.177 ± .012)		5.84 ± .25 (.230 ± .010)		5.72 ± .25 (.225 ± .010)	
(W) Width	MM (in.)	.127 ± .25 (.050 ± .010)		2.49 ± 0.2 (.098 ± .008)		2.03 ± .25 (.080 ± .010)		3.20 ± 0.2 (.126 ± .008)		6.40 ± 0.4 (.252 ± .016)		5.33 ± .25 (.210 ± .010)		6.35 ± .25 (.250 ± .010)	
(T) Thickness	MM (in.)	1.27 (.050)		1.52 (.060)		1.52 (.060)		1.52 (.060)		1.52 (.060)		1.52 (.060)		1.52 (.060)	
(t) Terminal	MIN. MAX.	.25 (.010) 1.02 (.040)		.25 (.010) .71 (.028)		.25 (.010) 1.02 (.040)		.25 (.010) .76 (.030)		.25 (.010) .76 (.030)		.25 (.010) 1.02 (.040)		.25 (.010) 1.02 (.040)	
WVDC		25	50	25	50	25	50	25	50	25	50	25	50	25	50
Cap. (μF)	.010														
	.012														
	.015														
	.018														
	.022														
	.027														
	.033														
	.039														
	.047														
	.056														
	.068														
	.082														
	.10														
	.12														
	.15														
	.18														
	.22														
	.27														
	.33														
	.39														
	.47														
	.56														
	.68														
	.82														
	1.0														
	1.5														
	1.8														
	2.2														
	2.7														



NOTES:
- Dimensions are in millimeters, dimensions in parenthesis are in inches.

**** IR and Vapor phase soldering only recommended.**

Y5V Dielectric
General Specifications

Capacitance Range
2200 pF to 3.3 μF (.5 Vrms, 1kHz)

Capacitance Tolerances
+80 -20%, +100, -0%

Operating Temperature Range
-30°C to +85°C

Temperature Characteristic
+22% to -82% max. within operating temperature

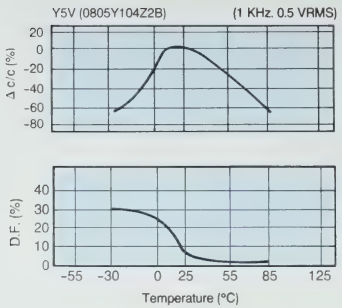
Voltage Ratings
50 & 25 VDC (+85°C)

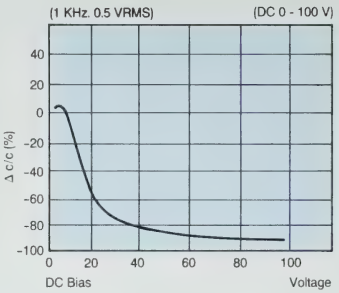
Dissipation Factor
5% max. (+25°C, .5 Vrms, 1kHz)

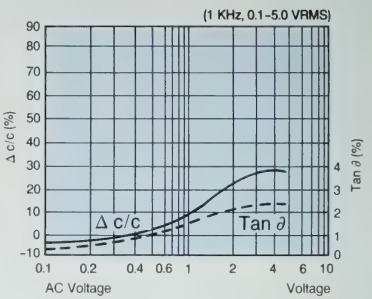
Insulation Resistance (+25°C, RVDC)
10,000 megohms min. or 1000 ohm-Farads min., whichever is less

Dielectric Strength
150% of rated VDC

Typical Characteristic Curves





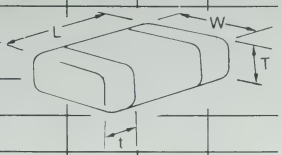


AVX KYOCERA

Y5V Dielectric

Preferred Sizes are Shaded

SIZE		0603		0805		1206		1210		1812**		1825**		2225**	
(L) Length	MM (in.)	1.52 ± .25 (.060 ± .010)		2.01 ± 0.2 (.079 ± .008)		3.20 ± 0.2 (.126 ± .008)		3.20 ± 0.2 (.126 ± .008)		4.50 ± 0.3 (.177 ± .012)		4.50 ± 0.3 (.177 ± .012)		5.72 ± .25 (.225 ± .010)	
(W) Width	MM (in.)	.76 ± .25 (.030 ± .010)		1.25 ± 0.2 (.049 ± .008)		1.60 ± 0.2 (.063 ± .008)		2.49 ± 0.2 (.098 ± .008)		3.20 ± 0.2 (.126 ± .008)		6.40 ± 0.4 (.252 ± .016)		6.35 ± .25 (.250 ± .010)	
(T) Thickness	MM (in.)	1.02 (.040)		1.27 (.050)		1.27 (.050)		1.27 (.050)		1.27 (.050)		1.27 (.050)		1.27 (.050)	
(t) Terminal	MIN. MAX.	.12 (.005) .38 (.015)		.25 (.010) .51 (.020)		.25 (.010) .71 (.028)		.25 (.010) .71 (.028)		.25 (.010) .76 (.030)		.25 (.010) .76 (.030)		.25 (.010) 1.02 (.040)	
WVDC		25	50	25	50	25	50	25	50	25	50	25	50	25	50
Cap. (pF)	2200 2700														
	3300 3900														
	4700 5600														
	6800 8200														
(μF)	.01 .012														
	.015 .018														
	.022 .027														
	.033 .039														
	.047 .056														
	.068 .082														
	.10 .12														
	.15 .18														
	.22 .27														
	.33 .39														
	.47 .56														
	.68 .82														
	1.0 1.2														
	1.5 1.8														
	2.2 2.7														
	3.3 3.9														



NOTES:
- Dimensions are in millimeters, dimensions in parenthesis are in inches.

**** IR and Vapor phase soldering only recommended.**

AVX KYOCERA

X7R & Y5V Dielectric
Special 16V Ratings

General Specifications

	X7R	Y5V
Capacitance Range 0.5 Vrms, 1kHz	0.015 - 0.47μF	0.047 - 4.7μF
Capacitance Tolerances	±10%, ±20%	+80, -20%
Operating Temperature Range	-55°C to +125°C	-30°C to +85°C
Temperature Characteristic	+15% (0 VDC)	+22%, -82%
Voltage Ratings	16VDC	16VDC
Dissipation Factor (+25°C, .5 Vrms, 1kHz)	3.5%	7.0%
Insulation Resistance (+25°C, RVDC)	100,000 Megohms min. or 1,000 ohm-Farads whichever is less	10,000 Megohms min. or 1,000 ohm-Farads whichever is less
Dielectric Strength	250% of Rated VDC	150% of Rated VDC

How to Order:

1206	Y	G	225	Z	A	T	2	T
Size (L" x W") 1206 1210	**Voltage** 16V = Y	**Dielectric** X7R =C Y5V =G	**Capacitance Code** (2 significant digits + no. of zeros)	**Capacitance Tolerance** K= ±10% M= ±20% Z= +80/-20%	**Failure Rate**	**Terminations** T = Plated Ni and Solder	**Marking* Packaging** 2 = Reel and Unmarked B = Bulk	**Special Code**

Capacitance Values

X7R

SIZE		0603	0805	1206	1210
(L) Length	MM (in.)	1.60 ± .15 (.063 ± .006)	2.01 ± 0.2 (.079 ± .008)	3.20 ± 0.2 (.126 ± .008)	3.20 ± 0.2 (.126 ± .008)
(W) Width	MM (in.)	.81 ± .15 (.032 ± .006)	1.25 ± 0.2 (.049 ± .008)	1.60 ± 0.2 (.063 ± .008)	2.49 ± 0.2 (.098 ± .008)
(T) Thickness	MM (in.)	1.02 (.040)	1.27 (.050)	1.27 (.050)	1.52 (.060)
(t) Terminal	MIN. MAX.	.25 (.010) .51 (.020)	.25 (.010) .71 (.028)	.25 (.010) .71 (.028)	.25 (.010) .71 (.028)
Cap. (pF)	.015				
	.018				
	.022				
	.027				
	.033				
	.039				
	.047				
	.056				
	.068				
	.082				
	1				
	15				
	18				
	22				
	33				
	39				
	47				

Y5V

SIZE		0603	0805	1206	1210
(L) Length	MM (in.)	1.52 ± .25 (.060 ± .010)	2.01 ± 0.2 (.079 ± .008)	3.20 ± 0.2 (.126 ± .008)	3.20 ± 0.2 (.126 ± .008)
(W) Width	MM (in.)	.76 ± .25 (.030 ± .010)	1.25 ± 0.2 (.049 ± .008)	1.60 ± 0.2 (.063 ± .008)	2.49 ± 0.2 (.098 ± .008)
(T) Thickness	MM (in.)	1.02 (.040)	1.30 (.051)	1.50 (.059)	1.70 (.067)
(t) Terminal	MIN. MAX.	.12 (.005) .38 (.015)	.25 (.010) .71 (.028)	.25 (.010) .71 (.028)	.25 (.010) .71 (.028)
Cap. (pF)	.047				
	.068				
	.1				
	.27				
	.33				
	.47				
	1.0				
	1.5				
	1.8				
	2.2				
	3.3				
	4.7				

AVX KYOCERA

Z5U & Y5V Dielectric
Low Profile Chips

General Specifications

	Z5U	Y5V
Capacitance Range 0.5 Vrms, 1kHz	0.01 - 0.33μF	0.01 - 0.47μF
Capacitance Tolerances	±20%, +100%, -0%	+80, -20%
Operating Temperature Range	+10°C to +85°C	-30°C to +85°C
Temperature Characteristic	+22%, -56%	+22%, -82%
Voltage Ratings	25VDC	25VDC
Dissipation Factor (+25°C, .5 Vrms, 1kHz)	3%	5%
Insulation Resistance (+25°C, RVDC)	100,000 Megohms min. or 1,000 ohm-Farads whichever is less	
Dielectric Strength	250% of Rated VDC	150% of Rated VDC

How to Order:

1206	3	E	224	Z	A	T	2	T
Size (L" x W") 1206 1210	**Voltage** 25V = 3	**Dielectric** Z5U =E Y5V =G	**Capacitance Code** (2 significant digits + no. of zeros)	**Capacitance Tolerance** M= ±20% Z= +80/-20% P= GMV	**Failure Rate**	**Terminations** T = Plated Ni and Solder	**Marking* Packaging** 2 = Reel and Unmarked B = Bulk	**Special Code** T = .026" Max. S = .022" Max. R = .018" Max. T = .015" Max.

*Standard product is unmarked on paper tape.

Capacitance Values for Various Thicknesses

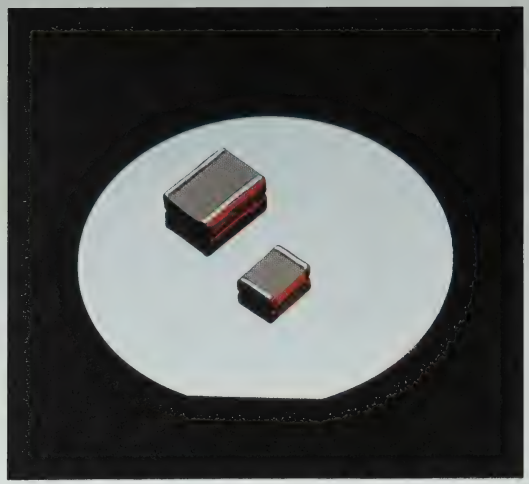
Z5U

Thickness MM (in.)		1206 .38 (.015)	1206 .46 (.018)	1206 .56 (.022)	1206 .66 (.026)	1210 .38 (.015)	1210 .46 (.018)	1210 .56 (.022)	1210 .66 (.026)
Cap. (pF)	2200								
	2700								
	3300								
	3900								
	4700								
	5600								
	6800								
	8200								
(μF)	.01								
	.012								
	.015								
	.018								
	.022								
	.027								
	.033								
	.039								
	.047								
	.056								
	.068								
	.082								
	.1								
	.12								
	.15								
	.18								
	.22								
	.27								
	.33								
	.39								
	.47								

Y5V

Thickness MM (in.)		1206 .38 (.015)	1206 .46 (.018)	1206 .56 (.022)	1206 .66 (.026)	1210 .38 (.015)	1210 .46 (.018)	1210 .56 (.022)	1210 .66 (.026)
Cap. (pF)	2200								
	2700								
	3300								
	3900								
	4700								
	5600								
	6800								
	8200								
(μF)	.01								
	.012								
	.015								
	.018								
	.022								
	.027								
	.033								
	.039								
	.047								
	.056								
	.068								
	.082								
	.1								
	.12								
	.15								
	.18								
	.22								
	.27								
	.33								
	.39								
	.47								

High Voltage Chips



High value, low leakage and small size are difficult parameters to obtain in capacitors for high voltage systems. AVX special high voltage MLC chips capacitors meet these performance characteristics and are designed for applications such as snubbers in high frequency power converters, resonators in SMPS, and high voltage coupling/DC blocking.

Larger physical sizes than normally encountered chips are used to make high voltage chips to maintain high insulation resistance. These larger sizes require that special precautions be taken in applying these chips in surface mount assemblies. This is due to differences in the coefficient of thermal expansion (CTE) between the substrate materials and chip capacitors.

These high voltage chip designs also exhibit ESRs well below 10 milliohms from 100 KHz through 20 MHz. The same dictates governing the high voltage design carries the added benefits of extremely low ESR in relatively low (.05 μF to .005 μF) capacitance and small packages.

AVX Styles: 1808, 1812, 1825, 2225 & 3640

How to Order:

1808	A	A	271	K	A	1	M	A
AVX Style	**Voltage** 500V = 7 600V = C 1000V = A 1500V = S 2000V = G 2500V = W 3000V = H 4000V = J 5000V = K	**Temperature Coefficient** C0G =A X7R = C	**Capacitance Code** (2 significant digits + no. of zeros) Examples: 10pF = 100 100pF = 101 1,000pF = 102 22,000pF = 223 220,000pF = 224 1μF = 105	**Capacitance Tolerance** C0G: J= ±5% K= ±10% M= ±20% X7R: K= ±10% M= ±20% Z= +80 -20%	**Failure Rate** A=Not applicable	**Termination** 1= Pd/Ag T= NiGuard Nickel Barrier Solder Plate	**Marking Packaging** M = Reel Marking B = Bulk 1 = Reel Unmarked 9 = Bulk Unmarked	**Special Code** A = Standard

AVX KYOCERA

High Voltage Chips

NPO Dielectric

General Specifications

Capacitance Range
100 pF to .018 μF

Capacitance Tolerances
$\pm$5%, $\pm$10%, $\pm$20%

Operating Temperature Range
-55°C to +125°C

Temperature Characteristic
0 $\pm$ 30 ppm/°C

Voltage Ratings
500 VDC, 1000 VDC, 2000 VDC, 3000 VDC, 4000 VDC, and 5000 VDC (+125°C)

Dissipation Factor
0.1% max. (+25°C and +125°C)
1.0 Vrms, 1kHz

Insulation Resistance (+25°C, at rated voltage)
100,000 megohms min. or 1000 ohm-Farads min., whichever is less

Insulation Resistance (+125°C, at rated voltage)
10,000 megohms min. or 100 ohm-Farads min., whichever is less

Dielectric Strength
120% rated voltage

X7R Dielectric

General Specifications

Capacitance Range
100 pF to 0.56 μF (1.0 Vrms, 1kHz)

Capacitance Tolerances
$\pm$5%, $\pm$10%, $\pm$20%

Operating Temperature Range
-55°C to +125°C

Temperature Characteristic
$\pm$15% (0 VDC)

Voltage Ratings
500 VDC, 600 VDC, 1000 VDC, 1500 VDC, 2000 VDC, and 2500 VDC (+125°C)

Dissipation Factor
2.5% max. (+25°C, 1.0 Vrms, 1kHz)

Insulation Resistance (+25°C, at rated voltage)
100,000 megohms min. or 1000 ohm-Farads min., whichever is less

Insulation Resistance (+125°C, at rated voltage)
10,000 megohms min. or 100 ohm-Farads min., whichever is less

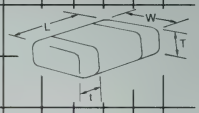
Dielectric Strength
120% rated voltage

AVX KYOCERA

High Voltage Chips

Capacitance Ranges/NPO Dielectric

SIZE		1206	1210	1808**		1812**			1825**				2225**				3640**				
(L) Length	MM (in.)	3.20 ± 0.2 (.126 ± .008)	3.20 ± 0.2 (.126 ± .008)	4.57 ± .25 (.180 ± .010)		4.50 ± 0.3 (.177 ± .012)			4.50 ± 0.25 (.177 ± .012)				5.72 ± .25 (.225 ± .010)				9.14 ± .25 (.360 ± .010)				
(W) Width	MM (in.)	1.60 ± 0.2 (.063 ± .008)	2.49 ± 0.2 (.098 ± .008)	2.03 ± .25 (.080 ± .010)		3.20 ± 0.2 (.126 ± .008)			6.40 ± 0.3 (.252 ± .012)				6.35 ± .25 (.250 ± .010)				10.2 ± .25 (.400 ± .010)				
(T) Thickness	MM (in.)	1.50 (.059)	2.03 (.079)	2.03 (.080)		2.54 (.100)			2.54 (.100)				2.54 (.100)				2.54 (.100)				
(t) Terminal	MIN. MAX.	.25 (.010) .71 (.028)	.25 (.010) .71 (.028)	.25 (.010) 1.02 (.040)		.25 (.010) 1.02 (.040)			.25 (.010) 1.02 (.040)				.25 (.010) 1.02 (.040)				.25 (.010) 1.02 (.040)				
WVDC		500	500	1000	2000	1000	2000	3000	1000	2000	3000	4000	1000	2000	3000	4000	1000	2000	3000	4000	5000
Cap. (pF)	10																				
	12																				
	15																				
	18																				
	22																				
	27																				
	33																				
	39																				
	47																				
	56																				
	68																				
	82																				
	100																				
	120																				
	150																				
	180																				
	220																				
	270																				
	330																				
	390																				
	470																				
	560																				
	680																				
	820																				
	1000																				
	1200																				
	1500																				
	1800																				
	2200																				
	2700																				
	3300																				
	3900																				
	4700																				
	5600																				
	6800																				
	8200																				
Cap. (μF)	.010																				
	.012																				
	.015																				
	.018																				



NOTES:
- Dimensions are in millimeters, dimensions in parenthesis are in inches.
- **Other capacitance values and voltages are available—contact AVX.**

■ = Industry preferred values.

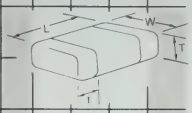
****IR and Vapor phase soldering only recommended.**

AVX KYOCERA

High Voltage Chips

Capacitance Ranges/X7R Dielectric

SIZE		1206	1210	1808**			1812**				1825**				2225**					3640**			
(L) Length	MM (in.)	3.20 ± 0.2 (.126 ± .008)	3.20 ± 0.2 (.126 ± .008)	4.57 ± .25 (.180 ± .010)			4.50 ± 0.3 (.177 ± .012)				4.50 ± 0.25 (.177 ± .012)				5.72 ± .25 (.225 ± .010)					9.14 ± .25 (.360 ± .010)			
(W) Width	MM (in.)	1.60 ± 0.2 (.063 ± .008)	2.49 ± 0.2 (.098 ± .008)	2.03 ± .25 (.080 ± .010)			3.20 ± 0.2 (.126 ± .008)				6.40 ± 0.3 (.252 ± .012)				6.35 ± .25 (.250 ± .010)					10.2 ± .25 (.400 ± .010)			
(T) Thickness	MM (in.)	1.50 (.059)	2.03 (.079)	2.03 (.080)			2.54 (.100)				2.54 (.100)				2.54 (.100)					2.54 (.100)			
(t) Terminal	MIN. MAX.	.25 (.010) .71 (.028)	.25 (.010) .71 (.028)	.25 (.010) 1.02 (.040)			.25 (.010) 1.02 (.040)				.25 (.010) 1.02 (.040)				.25 (.010) 1.02 (.040)					.25 (.010) 1.02 (.040)			
WVDC		500	500	600	1000	1500	600	1000	1500	2000	600	1000	1500	2000	600	1000	1500	2000	2500	1000	1500	2000	2500
Cap. (pF)	100																						
	120																						
	150																						
	180																						
	220																						
	270																						
	330																						
	390																						
	470																						
	560																						
	680																						
	820																						
	1000																						
	1200																						
	1500																						
	1800																						
	2200																						
	2700																						
	3300																						
	3900																						
	4700																						
	5600																						
	6800																						
	8200																						
Cap. (μF)	.010																						
	.012																						
	.015																						
	.018																						
	.022																						
	.027																						
	.033																						
	.039																						
	.047																						
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	.082																						
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	.56																						

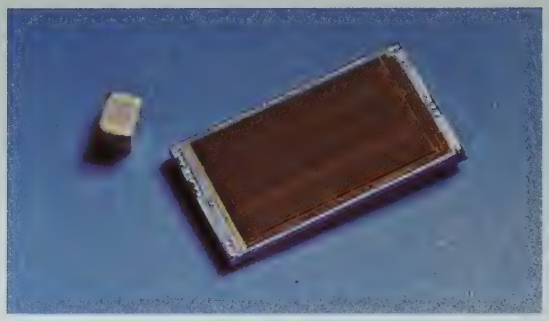


NOTES: • Dimensions are in millimeters, dimensions in parenthesis are in inches.
• **Other capacitance values and voltages are available—contact AVX.**

**** IR and Vapor phase soldering only recommended.**

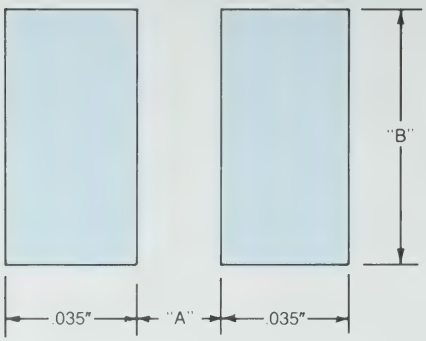
Low Inductance Chips

Specially Designed MLC Chips for Low Inductance



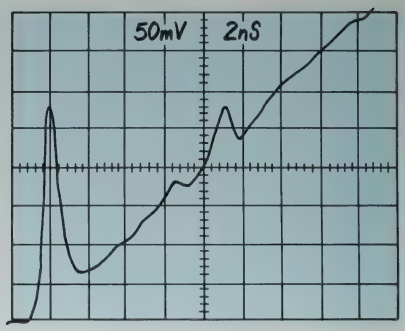
AVX's low inductance capacitors are designed for high speed IC packages and hybrid circuits. Their aspect ratio and size have been optimized to reduce inductance from the 2 nH range found in normal chip capacitors to less than 0.5 nH. Their low profile is ideal for package or hybrid surface mounting or inside cavity mounting, adjacent to the IC itself.

Recommended Solder Lands

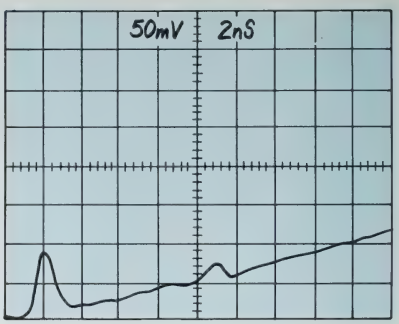


Chip Size	"A"	"B"
0508	.020"	.080"
0612	.030"	.120"

STANDARD 0805 CHIP
10 nF 0805 CHIP
TEST EDGE RATE = 200 mA/nS



• LOW L 0508 CHIP
40 nF, 0508 CHIP
TEST EDGE RATE = 200 mA/nS



Typical Inductance

Chip Size	nH	
	X7R	Z5U
0508	1.0	0.7
0612	0.5	0.4

AVX KYOCERA

Low Inductance Chips

Specially Designed MLC Chips for Low Inductance

AVX Styles: 0508 & 0612

How to Order:

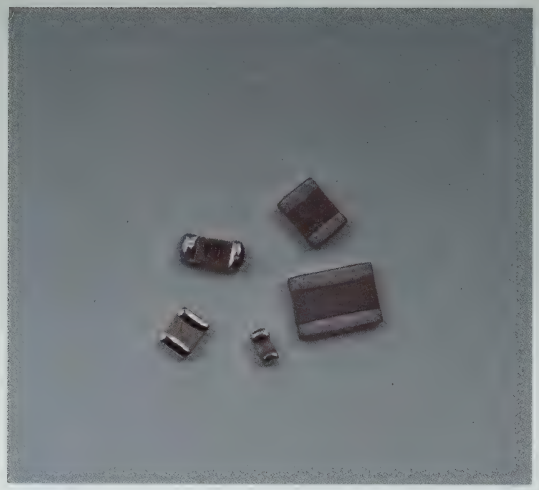
0508	5	C	822	M	A	1	1	A
AVX Style	**Voltage** 50V = 5	**Temperature Coefficient** C = X7R E = Z5U	**Capacitance Code** (2 significant digits + no. of zeros) Examples: 10 pF = 100 100 pF = 101 1,000 pF = 102 22,000 pF = 223 220,000 pF = 224 1 μF = 105	**Capacitance Tolerance** M = ±20% Z = +80, -20% P = GMV	**Failure Rate** A = Does not apply	**Termination** 1 = Pd/Ag T = NiGuard Nickel Barrier Solder Plate	**Marking Packaging** 9 = Bulk Unmarked 1 = Reel Unmarked	**Special Code** A = Standard

Capacitance Range: X7R and Z5U Dielectrics

Dimensions: MM (in.)

AVX Style		0508 (.050" thick)		0612			
Length (L)	MM (in.)	1.27 ± .25 (.050 ± .010)		1.6 ± .25 (.060 ± .010)			
Width (W)	MM (in.)	2.0 ± .25 (.080 ± .010)		3.2 ± .25 (.126 ± .010)			
Thickness (T)	MM (in.) Max.	1.27 (.050)		1.27 (.050)			
Terminal (t)*	MM (in.) Min.	.13 (.005)		.13 (.005)			
μF		X7R	Z5U	X7R		Z5U	
				25	50	25	50
.0082							
.010							
.015							
.018							
.022							
.033							
.068							
.082							
.100							
.15							
.27							

High Value MLC Chip Capacitors

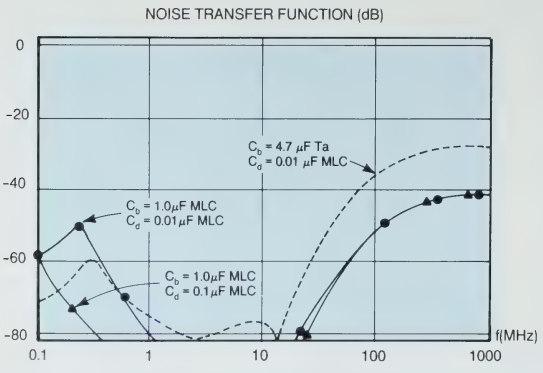


High value, small physical size MLCs are now practical and able to compete with electrolytics. MLCs are compatible with reflow surface mount processing. This allows the designer to take advantage of the lower ESRs and ESLs of MLCs to prevent transmission of PCB-generated noise to the backplane/motherboard and power supply.

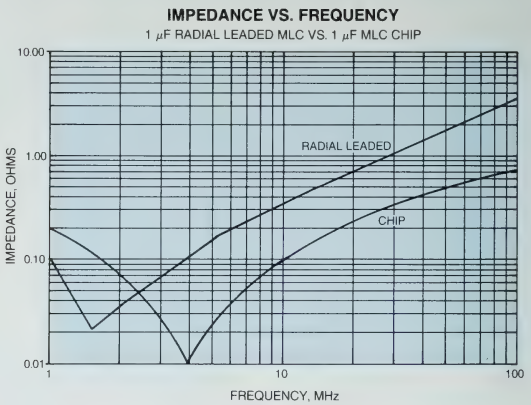
The value of power entry capacitors can be reduced by using larger value circuit level decoupling capacitors (0.1 μF). In effect, some of the total capacitance on the PCB is shifted from the power entry capacitor, C_b, to larger-valued decoupling capacitors, C_d.

Typical Inductance

Chip Size	nH
1510	1.0
2225	1.3
3640	1.5



Noise transfer function from switched gates to power entry point (Ferrite bead used on power feed line in all cases)



High Value MLC Chip Capacitors

High Value MLCs

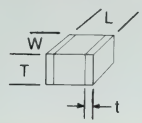
AVX Styles: 1510, 2225 & 3640

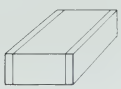
How to Order:

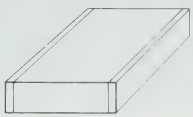
1510	5	E	105	M	A	1	B	A
AVX Style	**Voltage** 50V = 5	**Temperature Coefficient** X7R =C Z5U = E	**Capacitance Code** (2 significant digits + no. of zeros) Examples: 10pF = 100 100pF = 101 1,000pF = 102 22,000pF = 223 220,000pF = 224 1μF = 105	**Capacitance Tolerance** X7R: K= ±10% M= ±20% Z= +80/-20% Z5U: M= ±20% Z= +80 -20%	**Failure Rate** A=Does not apply	**Termination** 1= Pd/Ag T= NiGuard Nickel Barrier Solder Plate	**Marking Packaging** M = Reel Marking B = Bulk	**Special Code** A = Standard

Maximum Capacitance: X7R and Z5U Dielectrics

Dimensions: MM (in.)





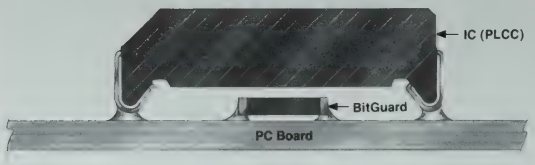


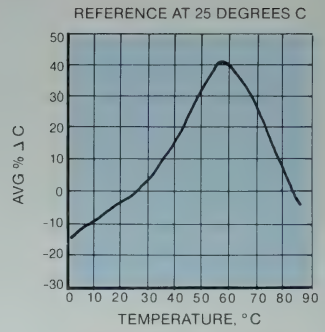
AVX Style		1510**	2225**	3640**
Length (L)	MM (in.)	3.81 ± .25 (.150 ± .010)	5.72 ± .25 (.225 ± .010)	9.14 ± .25 (.360 ± .010)
Width (W)	MM (in.)	2.5 ± 0.2 (.098 ± .010)	6.35 ± .25 (.250 ± .010)	10.2 ± .25 (.400 ± .010)
Thickness (T)	MM (in.)	2.54 (.100)	2.54 (.100)	2.54 (.100)
Terminal (t)	MM (in.)	.64 ± .25 (.025 ± .010)	.64 ± .25 (.025 ± .010)	.64 ± .25 (.025 ± .010)
MAX CAP., μF		50VDC	50VDC	50VDC
X7R		0.47	1.0	5.0
Z5U		1.0	2.0	8.2

****IR and Vapor Phase soldering only recommended.**

Advance Decoupling - BitGuard
General Information and Electrical Specifications

General Description
This capacitor is designed to be used beneath a plastic leaded chip carrier (PLCC) in the void for the leads or on the back side of the PC board or substrate when other surface mount components are used in thin high density modules.





Temperature Characteristics

The ceramic dielectric constant temperature performance has been optimized by maximizing capacitance at or near the operating temperature. The peak capacitance occurs at 60°C as opposed to 25°C for most high K dielectrics.

Electrical Performance Characteristics

1206 BitGuard Electrical Performance Characteristics

AVX Part No.			12063T104PA12X			12063T224PA11X		
Length			.126" ± .008"			.126" ± .008"		
Width			.063" ± .008"			.063" ± .008"		
Thickness			.025" + .005"-0.0"			.040" to .050"		
Land Length			.030" max, .010" min			.030" max, .010" min		
Termination			Pd 20%, Ag 80%			Pd 20%, Ag 80%		
PARAMETER	TEST CONDITION	UNIT	MIN	TYP	MAX	MIN	TYP	MAX
Capacitance C_0	25°C, .5 Vrms, 0V, 1kHz	μF	.10	.14	—	.22	.24	—
Capacitance C_S	25°C, .5 Vrms, 5V, 1kHz	μF	.10	.14	—	.22	.24	—
Capacitance C_{min}	0°C to +85°C, .5 Vrms @ 0V, 1kHz	μF	.08	—	—	.18	—	—
Capacitance $C_{operating}$	60°C, .05 Vrms, 5V, 1kHz	μF	.15	.20	—	.15	.20	—
ESR	Resonant Freq 10-13 MHz	Ω	—	.06	—	—	.06	—
Inductance	di/dt = 100 ma/ns	nH	—	—	1.5	—	—	1.5
Power Rating, $P_{25°C}$	25°	W	—	—	.25	—	—	.25
Temperature, T_A	operating	°C	0	—	85	0	—	85
Temperature, T_S	storage	°C	-55	—	150	-55	—	150
Insulation Resistance	25°C	M Ω-mfd	1000	—	—	1000	—	—
Thermal Expansion, T_E	0 to +85°C	ppm °C	—	11.5	—	—	11.5	—

1210 BitGuard Electrical Performance Characteristics

AVX Part No.			12103T903QA12X			12103T204QA12X		
Length			.120" ± .008"			.120" ± .008"		
Width			.100" ± .008"			.100" ± .008"		
Thickness			.015" + .003"-0.0"			.021" + .005"-0.0"		
Land Length			.025" max, .010" min			.025" max, .010" min		
Termination			Pd 20%, Ag 80%			Pd 20%, Ag 80%		
PARAMETER	TEST CONDITION	UNIT	MIN	TYP	MAX	MIN	TYP	MAX
Capacitance C_0	25°C, .5 Vrms, 0V, 1kHz	μF	.11	.15	—	.23	.25	—
Capacitance C_S	25°C, .5 Vrms, 5V, 1kHz	μF	.11	.15	—	.23	.25	—
Capacitance C_{min}	0°C to +85°C, .5 Vrms @ 0V, 1kHz	μF	.09	—	—	.20	—	—
Capacitance $C_{operating}$	60°C, .05 Vrms, 5V, 1kHz	μF	.15	.20	—	.25	.28	—
ESR	Resonant Freq 10-13 MHz	Ω	—	.06	—	—	.06	—
Inductance	di/dt = 100 ma/ns	nH	—	—	1.0	—	—	1.0
Power Rating, $P_{25°C}$	25°	W	—	—	.25	—	—	.25
Temperature, T_A	operating	°C	0	—	85	0	—	85
Temperature, T_S	storage	°C	-55	—	150	-55	—	150
Insulation Resistance	25°C	M Ω-mfd	1000	—	—	1000	—	—
Thermal Expansion, T_E	0 to +85°C	ppm °C	—	11.5	—	—	11.5	—

AVX KYOCERA

Chip Marking Identification System

Marking

Proposed EIA Standard:

Two Position Marking:

Alpha: 1st position significant figures of capacitance

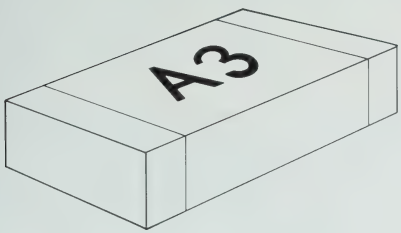
Numerical: 2nd position decimal multiplier of capacitance

NOTE: ● 0504 and 0603 available unmarked only

CAPACITANCE

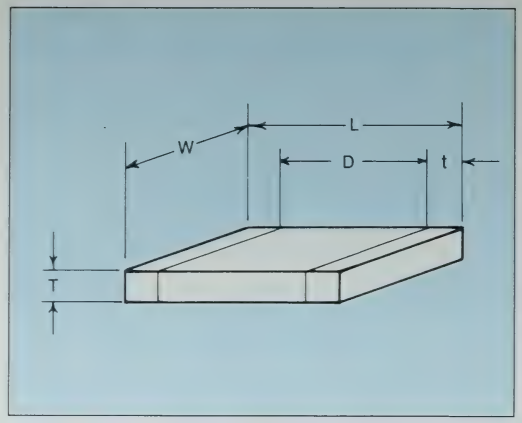
Letter	0	1	2	3	4	5
A	1.0	10	100	1000	10,000	100,000
B	1.1	11	110	1100	11,000	110,000
C	1.2	12	120	1200	12,000	120,000
D	1.3	13	130	1300	13,000	130,000
E	1.5	15	150	1500	15,000	150,000
F	1.6	16	160	1600	16,000	160,000
G	1.8	18	180	1800	18,000	180,000
H	2.0	20	200	2000	20,000	200,000
J	2.2	22	220	2200	22,000	220,000
K	2.4	24	240	2400	24,000	240,000
L	2.7	27	270	2700	27,000	270,000
M	3.0	30	300	3000	30,000	300,000
N	3.3	33	330	3300	33,000	330,000
P	3.6	36	360	3600	36,000	360,000
Q	3.9	39	390	3900	39,000	390,000
R	4.3	43	430	4300	43,000	430,000
S	4.7	47	470	4700	47,000	470,000
T	5.1	51	510	5100	51,000	510,000
U	5.6	56	560	5600	56,000	560,000
V	6.2	62	620	6200	62,000	620,000

Letter	0	1	2	3	4	5
W	6.8	68	680	6800	68,000	680,000
X	7.5	75	750	7500	75,000	750,000
Y	8.2	82	820	8200	82,000	820,000
Z	9.1	91	910	9100	91,000	910,000
a	2.5					
b	3.5					
d	4.0					
e	4.5					
f	5.0					
m	6.0					
n	7.0					
t	8.0					
y	9.0					
	×1.0	×10	×100	×1000	×10,000	×100,000



TWO POSITION MARKING
(1000 pF)

MIL-C-55681/Chips
Part Number Example



Military Designation Per MIL-C-55681

Part Number Example

(example)	CDR01	BP	101	B	K	S	M

- MIL Style
- Voltage-temperature Limits
- Capacitance
- Rated Voltage
- Capacitance Tolerance
- Termination Finish
- Failure Rate

MIL Style: CDR01, CDR02, CDR03, CDR04, CDR05, CDR06

Voltage Temperature Limits:
BP = 0 ± 30 ppm/°C without voltage; 0 ± 30 ppm/°C with rated voltage from -55°C to +125°C
BX = ±15% without voltage; +15 -25% with rated voltage from -55°C to +125°C

Capacitance:
Two digit figures followed by multiplier (number of zeros to be added) e.g., 101 = 100 pF

Rated Voltage: A = 50V, B = 100V

Capacitance Tolerance:
J ±5%, K ±10%, M ±20%

Termination Finish:
M = Palladium Silver
N = Silver Nickel Gold
S = Solder-coated
U = Base Metallization/Barrier Metal/Solder Coated*
W = Base Metallization/Barrier Metal/Tinned (Tin or Tin/Lead Alloy)

Failure Rate Level: M = 1.0%, P = .1%, R = .01%, S = .001%

Packaging: Bulk is standard packaging. Tape and reel per RS481 is available upon request.

*Solder shall have a melting point of 200°C or less.

Cross Reference: AVX/MIL-C-55681/CDR01 thru CDR06*

Per MIL-C-55681	AVX Style	Length (L)	Width (W)	Thickness (T)		D		Termination Band (t)	
				Max.	Min.	Max.	Min.	Max.	Min.
CDR01	0805	.080 ± .015	.050 ± .015	.055	.020	——	.030	——	.010
CDR02	1805	.180 ± .015	.050 ± .015	.055	.020	——	——	.030	.010
CDR03	1808	.180 ± .015	.080 ± .015	.080	.020	——	——	.030	.010
CDR04	1812	.180 ± .015	.125 ± .015	.080	.020	——	——	.030	.010
CDR05	1825	$.180^{+.020}_{-.015}$	$.250^{+.020}_{-.015}$	.080	.020	——	——	.030	.010
CDR06	2225	.225 ± .020	.250 ± .020	.080	.020	——	——	.030	.010

* For CDR11, 12, 13, and 14 see AVX Microwave Chip Capacitor Catalog

MIL-C-55681/Chips
Military Part Number Identification CDR01 thru CDR06

CDR01 thru CDR06 to MIL-C-55681

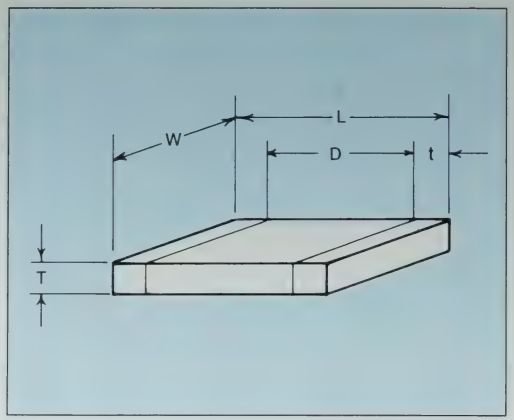
Military Type Designation	Capacitance in pF	Capacitance tolerance	Rated temperature and voltage-temperature limits	WVDC
AVX Style 0805/CDR01				
CDR01BP100B---	10	J,K	BP	100
CDR01BP120BJ--	12	J	BP	100
CDR01BP150B---	15	J,K	BP	100
CDR01BP180BJ--	18	J	BP	100
CDR01BP220B---	22	J,K	BP	100
CDR01BP270BJ--	27	J	BP	100
CDR01BP330B---	33	J,K	BP	100
CDR01BP390BJ--	39	J	BP	100
CDR01BP470B---	47	J,K	BP	100
CDR01BP560BJ--	56	J	BP	100
CDR01BP680B---	68	J,K	BP	100
CDR01BP820BJ--	82	J	BP	100
CDR01BP101B---	100	J,K	BP	100
CDR01B--121B---	120	J,K	BP,BX	100
CDR01B--151B---	150	J,K	BP,BX	100
CDR01B--181B---	180	J,K	BP,BX	100
CDR01BX221B---	220	K,M	BX	100
CDR01BX271BK--	270	K	BX	100
CDR01BX331B---	330	K,M	BX	100
CDR01BX391BK--	390	K	BX	100
CDR01BX471B---	470	K,M	BX	100
CDR01BX561BK--	560	K	BX	100
CDR01BX681B---	680	K,M	BX	100
CDR01BX821BK--	820	K	BX	100
CDR01BX102B---	1000	K,M	BX	100
CDR01BX122BK--	1200	K	BX	100
CDR01BX152B---	1500	K,M	BX	100
CDR01BX182BK--	1800	K	BX	100
CDR01BX222B---	2200	K,M	BX	100
CDR01BX272BK--	2700	K	BX	100
CDR01BX332B---	3300	K,M	BX	100
CDR01BX392AK--	3900	K	BX	50
CDR01BX472A---	4700	K,M	BX	50
AVX Style 1805/CDR02				
CDR02BP221B---	220	J,K	BP	100
CDR02BP271BJ--	270	J	BP	100
CDR02BX392BK--	3900	K	BX	100
CDR02BX472B---	4700	K,M	BX	100
CDR02BX562BK--	5600	K	BX	100
CDR02BX682B---	6800	K,M	BX	100
CDR02BX822BK--	8200	K	BX	100
CDR02BX103B---	10,000	K,M	BX	100
CDR02BX123AK--	12,000	K	BX	50
CDR02BX153A---	15,000	K,M	BX	50
CDR02BX183AK--	18,000	K	BX	50
CDR02BX223A---	22,000	K,M	BX	50

Add appropriate failure rate
Add appropriate termination finish
Capacitance Tolerance

Military Type Designation	Capacitance in pF	Capacitance tolerance	Rated temperature and voltage-temperature limits	WVDC
AVX Style 1808/CDR03				
CDR03BP331B---	330	J,K	BP	100
CDR03BP391BJ--	390	J	BP	100
CDR03BP471B---	470	J,K	BP	100
CDR03BP561BJ--	560	J	BP	100
CDR03BP681B---	680	J,K	BP	100
CDR03BP821BJ--	820	J	BP	100
CDR03BP102B---	1000	J,K	BP	100
CDR03BX123BK--	12,000	K	BX	100
CDR03BX153B---	15,000	K,M	BX	100
CDR03BX183BK--	18,000	K	BX	100
CDR03BX223B---	22,000	K,M	BX	100
CDR03BX273BK--	27,000	K	BX	100
CDR03BX333B---	33,000	K,M	BX	100
CDR03BX393AK--	39,000	K	BX	50
CDR03BX473A---	47,000	K,M	BX	50
CDR03BX563AK--	56,000	K	BX	50
CDR03BX683A---	68,000	K,M	BX	50
AVX Style 1812/CDR04				
CDR04BP122BJ--	1200	J	BP	100
CDR04BP152B---	1500	J,K	BP	100
CDR04BP182BJ--	1800	J	BP	100
CDR04BP222B---	2200	J,K	BP	100
CDR04BP272BJ--	2700	J	BP	100
CDR04BP332B---	3300	J,K	BP	100
CDR04BX393BK--	39,000	K	BX	100
CDR04BX473B---	47,000	K,M	BX	100
CDR04BX563BK--	56,000	K	BX	100
CDR04BX823AK--	82,000	K	BX	50
CDR04BX104A---	100,000	K,M	BX	50
CDR04BX124AK--	120,000	K	BX	50
CDR04BX154A---	150,000	K,M	BX	50
CDR04BX184AK--	180,000	K	BX	50
AVX Style 1825/CDR05				
CDR05BP392B---	3900	J,K	BP	100
CDR05BP472B---	4700	J,K	BP	100
CDR05BP562B---	5600	J,K	BP	100
CDR05BX683B---	68,000	K,M	BX	100
CDR05BX823BK--	82,000	K	BX	100
CDR05BX104B---	100,000	K,M	BX	100
CDR05BX124BK--	120,000	K	BX	100
CDR05BX154B---	150,000	K,M	BX	100
CDR05BX224A---	220,000	K,M	BX	50
CDR05BX274AK--	270,000	K	BX	50
CDR05BX334A---	330,000	K,M	BX	50
AVX Style 2225/CDR06				
CDR06BP682B---	6800	J,K	BP	100
CDR06BP822B---	8200	J,K	BP	100
CDR06BP103B---	10,000	J,K	BP	100
CDR06BX394AK--	390,000	K	BX	50
CDR06BX474A---	470,000	K,M	BX	50

Add appropriate failure rate
Add appropriate termination finish
Capacitance Tolerance

MIL-C-55681/Chips
Military Part Number Identification CDR31 thru CDR35



Military Designation Per MIL-C-55681

Part Number Example

(example) CDR31 BP 101 B K S M

- MIL Style
- Voltage-temperature Limits
- Capacitance
- Rated Voltage
- Capacitance Tolerance
- Termination Finish
- Failure Rate

MIL Style: CDR31, CDR32, CDR33, CDR34, CDR35

Voltage Temperature Limits:
BP = 0 ± 30 ppm/°C without voltage; 0 ± 30 ppm/°C with rated voltage from -55°C to +125°C
BX = ±15% without voltage; +15 -25% with rated voltage from -55°C to +125°C

Capacitance:
Two digit figures followed by multiplier (number of zeros to be added) e.g., 101 = 100 pF

Rated Voltage: A = 50V, B = 100V

Capacitance Tolerance:
C ±.25pF, D ±.5pF, F ±1%,
J ±5%, K ±10%, M ±20%

Termination Finish:
M = Palladium Silver
N = Silver Nickel Gold
S = Solder-coated
U = Base Metallization/Barrier Metal/Solder Coated*
W = Base Metallization/Barrier Metal/Tinned (Tin or Tin/Lead Alloy)

Failure Rate Level: M = 1.0%, P = .1%, R = .01%, S = .001%

Packaging: Bulk is standard packaging. Tape and reel per RS481 is available upon request.

*Solder shall have a melting point of 200°C or less.

Cross Reference: AVX/MIL-C-55681/CDR31 thru CDR35

Per MIL-C-55681 (Metric Sizes)	AVX Style	Length (L) (mm)	Width (W) (mm)	Thickness (T)	D	Termination Band (t)	
				Max. (mm)	Min. (mm)	Max. (mm)	Min. (mm)
CDR31*	0805	2.00	1.25	1.3	.50	.70	.30
CDR32*	1206	3.20	1.60	1.3	——	.70	.30
CDR33**	1210	3.20	2.50	1.5	——	.70	.30
CDR34**	1812	4.50	3.20	1.5	——	.70	.30
CDR35**	1825	4.50	6.40	1.5	——	.70	.30

MIL-C-55681/Chips

Military Part Number Identification CDR31

CDR31 to MIL-C-55681/7

Military Type Designation 1/	Capacitance in pF	Capacitance tolerance	Rated temperature and voltage-temperature limits	WVDC
CDR31 (BP)				
CDR31BP1R0B---	1.0	C	BP	100
CDR31BP1R1B---	1.1	C	BP	100
CDR31BP1R2B---	1.2	C	BP	100
CDR31BP1R3B---	1.3	C	BP	100
CDR31BP1R5B---	1.5	C	BP	100
CDR31BP1R6B---	1.6	C	BP	100
CDR31BP1R8B---	1.8	C	BP	100
CDR31BP2R0B---	2.0	C	BP	100
CDR31BP2R2B---	2.2	C	BP	100
CDR31BP2R4B---	2.4	C	BP	100
CDR31BP2R7B---	2.7	C,D	BP	100
CDR31BP3R0B---	3.0	C,D	BP	100
CDR31BP3R3B---	3.3	C,D	BP	100
CDR31BP3R6B---	3.6	C,D	BP	100
CDR31BP3R9B---	3.9	C,D	BP	100
CDR31BP4R3B---	4.3	C,D	BP	100
CDR31BP4R7B---	4.7	C,D	BP	100
CDR31BP5R1B---	5.1	C,D	BP	100
CDR31BP5R6B---	5.6	C,D	BP	100
CDR31BP6R2B---	6.2	C,D	BP	100
CDR31BP6R8B---	6.8	C,D	BP	100
CDR31BP7R5B---	7.5	C,D	BP	100
CDR31BP8R2B---	8.2	C,D	BP	100
CDR31BP9R1B---	9.1	C,D	BP	100
CDR31BP100B---	10	J,K	BP	100
CDR31BP110B---	11	J,K	BP	100
CDR31BP120B---	12	J,K	BP	100
CDR31BP130B---	13	J,K	BP	100
CDR31BP150B---	15	J,K	BP	100
CDR31BP160B---	16	J,K	BP	100
CDR31BP180B---	18	J,K	BP	100
CDR31BP200B---	20	F,J,K	BP	100
CDR31BP220B---	22	F,J,K	BP	100
CDR31BP240B---	24	F,J,K	BP	100
CDR31BP270B---	27	F,J,K	BP	100
CDR31BP300B---	30	F,J,K	BP	100
CDR31BP330B---	33	F,J,K	BP	100
CDR31BP360B---	36	F,J,K	BP	100
CDR31BP390B---	39	F,J,K	BP	100
CDR31BP430B---	43	F,J,K	BP	100
CDR31BP470B---	47	F,J,K	BP	100
CDR31BP510B---	51	F,J,K	BP	100
CDR31BP560B---	56	F,J,K	BP	100
CDR31BP620B---	62	F,J,K	BP	100
CDR31BP680B---	68	F,J,K	BP	100
CDR31BP750B---	75	F,J,K	BP	100
CDR31BP820B---	82	F,J,K	BP	100
CDR31BP910B---	91	F,J,K	BP	100

Military Type Designation 1/	Capacitance in pF	Capacitance tolerance	Rated temperature and voltage-temperature limits	WVDC
CDR 31 (BP) cont'd				
CDR31BP101B---	100	F,J,K	BP	100
CDR31BP111B---	110	F,J,K	BP	100
CDR31BP121B---	120	F,J,K	BP	100
CDR31BP131B---	130	F,J,K	BP	100
CDR31BP151B---	150	F,J,K	BP	100
CDR31BP161B---	160	F,J,K	BP	100
CDR31BP181B---	180	F,J,K	BP	100
CDR31BP201B---	200	F,J,K	BP	100
CDR31BP221B---	220	F,J,K	BP	100
CDR31BP241B---	240	F,J,K	BP	100
CDR31BP271B---	270	F,J,K	BP	100
CDR31BP301B---	300	F,J,K	BP	100
CDR31BP331B---	330	F,J,K	BP	100
CDR31BP361B---	360	F,J,K	BP	100
CDR31BP391B---	390	F,J,K	BP	100
CDR31BP431B---	430	F,J,K	BP	100
CDR31BP471B---	470	F,J,K	BP	100
CDR31BP511A---	510	F,J,K	BP	50
CDR31BP561A---	560	F,J,K	BP	50
CDR31BP621A---	620	F,J,K	BP	50
CDR31BP681A---	680	F,J,K	BP	50
CDR31 (BX)				
CDR31BX471B---	470	K,M	BX	100
CDR31BX561B---	560	K,M	BX	100
CDR31BX681B---	680	K,M	BX	100
CDR31BX821B---	820	K,M	BX	100
CDR31BX102B---	1,000	K,M	BX	100
CDR31BX122B---	1,200	K,M	BX	100
CDR31BX152B---	1,500	K,M	BX	100
CDR31BX182B---	1,800	K,M	BX	100
CDR31BX222B---	2,200	K,M	BX	100
CDR31BX272B---	2,700	K,M	BX	100
CDR31BX332B---	3,300	K,M	BX	100
CDR31BX392B---	3,900	K,M	BX	100
CDR31BX472B---	4,700	K,M	BX	100
CDR31BX562A---	5,600	K,M	BX	50
CDR31BX682A---	6,800	K,M	BX	50
CDR31BX822A---	8,200	K,M	BX	50
CDR31BX103A---	10,000	K,M	BX	50
CDR31BX123A---	12,000	K,M	BX	50
CDR31BX153A---	15,000	K,M	BX	50
CDR31BX183A---	18,000	K,M	BX	50

1/ The complete part number will include additional symbols to indicate capacitance tolerance, termination and failure rate level.

AVX KYOCERA

MIL-C-55681/Chips

Military Part Number Identification CDR32

CDR32 to MIL-C-55681/8

Military Type Designation 1/	Capacitance in pF	Capacitance tolerance	Rated temperature and voltage-temperature limits	WVDC
CDR32 (BP)				
CDR32BP1R0B---	1.0	C	BP	100
CDR32BP1R1B---	1.1	C	BP	100
CDR32BP1R2B---	1.2	C	BP	100
CDR32BP1R3B---	1.3	C	BP	100
CDR32BP1R5B---	1.5	C	BP	100
CDR32BP1R6B---	1.6	C	BP	100
CDR32BP1R8B---	1.8	C	BP	100
CDR32BP2R0B---	2.0	C	BP	100
CDR32BP2R2B---	2.2	C	BP	100
CDR32BP2R4B---	2.4	C	BP	100
CDR32BP2R7B---	2.7	C,D	BP	100
CDR32BP3R0B---	3.0	C,D	BP	100
CDR32BP3R3B---	3.3	C,D	BP	100
CDR32BP3R6B---	3.6	C,D	BP	100
CDR32BP3R9B---	3.9	C,D	BP	100
CDR32BP4R3B---	4.3	C,D	BP	100
CDR32BP4R7B---	4.7	C,D	BP	100
CDR32BP5R1B---	5.1	C,D	BP	100
CDR32BP5R6B---	5.6	C,D	BP	100
CDR32BP6R2B---	6.2	C,D	BP	100
CDR32BP6R8B---	6.8	C,D	BP	100
CDR32BP7R5B---	7.5	C,D	BP	100
CDR32BP8R2B---	8.2	C,D	BP	100
CDR32BP9R1B---	9.1	C,D	BP	100
CDR32BP100B---	10	J,K	BP	100
CDR32BP110B---	11	J,K	BP	100
CDR32BP120B---	12	J,K	BP	100
CDR32BP130B---	13	J,K	BP	100
CDR32BP150B---	15	J,K	BP	100
CDR32BP160B---	16	J,K	BP	100
CDR32BP180B---	18	J,K	BP	100
CDR32BP200B---	20	F,J,K	BP	100
CDR32BP220B---	22	F,J,K	BP	100
CDR32BP240B---	24	F,J,K	BP	100
CDR32BP270B---	27	F,J,K	BP	100
CDR32BP300B---	30	F,J,K	BP	100
CDR32BP330B---	33	F,J,K	BP	100
CDR32BP360B---	36	F,J,K	BP	100
CDR32BP390B---	39	F,J,K	BP	100
CDR32BP430B---	43	F,J,K	BP	100
CDR32BP470B---	47	F,J,K	BP	100
CDR32BP510B---	51	F,J,K	BP	100
CDR32BP560B---	56	F,J,K	BP	100
CDR32BP620B---	62	F,J,K	BP	100
CDR32BP680B---	68	F,J,K	BP	100
CDR32BP750B---	75	F,J,K	BP	100
CDR32BP820B---	82	F,J,K	BP	100
CDR32BP910B---	91	F,J,K	BP	100

Military Type Designation 1/	Capacitance in pF	Capacitance tolerance	Rated temperature and voltage-temperature limits	WVDC
CDR32 (BP) cont'd				
CDR32BP101B---	100	F,J,K	BP	100
CDR32BP111B---	110	F,J,K	BP	100
CDR32BP121B---	120	F,J,K	BP	100
CDR32BP131B---	130	F,J,K	BP	100
CDR32BP151B---	150	F,J,K	BP	100
CDR32BP161B---	160	F,J,K	BP	100
CDR32BP181B---	180	F,J,K	BP	100
CDR32BP201B---	200	F,J,K	BP	100
CDR32BP221B---	220	F,J,K	BP	100
CDR32BP241B---	240	F,J,K	BP	100
CDR32BP271B---	270	F,J,K	BP	100
CDR32BP301B---	300	F,J,K	BP	100
CDR32BP331B---	330	F,J,K	BP	100
CDR32BP361B---	360	F,J,K	BP	100
CDR32BP391B---	390	F,J,K	BP	100
CDR32BP431B---	430	F,J,K	BP	100
CDR32BP471B---	470	F,J,K	BP	100
CDR32BP511B---	510	F,J,K	BP	100
CDR32BP561B---	560	F,J,K	BP	100
CDR32BP621B---	620	F,J,K	BP	100
CDR32BP681B---	680	F,J,K	BP	100
CDR32BP751B---	750	F,J,K	BP	100
CDR32BP821B---	820	F,J,K	BP	100
CDR32BP911B---	910	F,J,K	BP	100
CDR32BP102B---	1,000	F,J,K	BP	100
CDR32BP112A---	1,100	F,J,K	BP	50
CDR32BP122A---	1,200	F,J,K	BP	50
CDR32BP132A---	1,300	F,J,K	BP	50
CDR32BP152A---	1,500	F,J,K	BP	50
CDR32BP162A---	1,600	F,J,K	BP	50
CDR32BP182A---	1,800	F,J,K	BP	50
CDR32BP202A---	2,000	F,J,K	BP	50
CDR32BP222A---	2,200	F,J,K	BP	50
CDR32 (BX)				
CDR32BX472B---	4,700	K,M	BX	100
CDR32BX562B---	5,600	K,M	BX	100
CDR32BX682B---	6,800	K,M	BX	100
CDR32BX822B---	8,200	K,M	BX	100
CDR32BX103B---	10,000	K,M	BX	100
CDR32BX123B---	12,000	K,M	BX	100
CDR32BX153B---	15,000	K,M	BX	100
CDR32BX183A---	18,000	K,M	BX	50
CDR32BX223A---	22,000	K,M	BX	50
CDR32BX273A---	27,000	K,M	BX	50
CDR32BX333A---	33,000	K,M	BX	50
CDR32BX393A---	39,000	K,M	BX	50

1/ The complete part number will include additional symbols to indicate capacitance tolerance, termination and failure rate level.

AVX KYOCERA

MIL-C-55681/Chips

Military Part Number Identification CDR33/34/35

CDR33/34/35 to MIL-C-55681/9/10/11

Military Type Designation 1/	Capacitance in pF	Capacitance tolerance	Rated temperature and voltage-temperature limits	WVDC
CDR33 (BP)				
CDR33BP102B---	1,000	F,J,K	BP	100
CDR33BP112B---	1,100	F,J,K	BP	100
CDR33BP122B---	1,200	F,J,K	BP	100
CDR33BP132B---	1,300	F,J,K	BP	100
CDR33BP152B---	1,500	F,J,K	BP	100
CDR33BP162B---	1,600	F,J,K	BP	100
CDR33BP182B---	1,800	F,J,K	BP	100
CDR33BP202B---	2,000	F,J,K	BP	100
CDR33BP222B---	2,200	F,J,K	BP	100
CDR33BP242A---	2,400	F,J,K	BP	50
CDR33BP272A---	2,700	F,J,K	BP	50
CDR33BP302A---	3,000	F,J,K	BP	50
CDR33BP332A---	3,300	F,J,K	BP	50
CDR33 (BX)				
CDR33BX153B---	15,000	K,M	BX	100
CDR33BX183B---	18,000	K,M	BX	100
CDR33BX223B---	22,000	K,M	BX	100
CDR33BX273B---	27,000	K,M	BX	100
CDR33BX393A---	39,000	K,M	BX	50
CDR33BX473A---	47,000	K,M	BX	50
CDR33BX563A---	56,000	K,M	BX	50
CDR33BX683A---	68,000	K,M	BX	50
CDR33BX823A---	82,000	K,M	BX	50
CDR33BX104A---	100,000	K,M	BX	50
CDR34 (BP)				
CDR34BP222B---	2,200	F,J,K	BP	100
CDR34BP242B---	2,400	F,J,K	BP	100
CDR34BP272B---	2,700	F,J,K	BP	100
CDR34BP302B---	3,000	F,J,K	BP	100
CDR34BP332B---	3,300	F,J,K	BP	100
CDR34BP362B---	3,600	F,J,K	BP	100
CDR34BP392B---	3,900	F,J,K	BP	100
CDR34BP432B---	4,300	F,J,K	BP	100
CDR34BP472B---	4,700	F,J,K	BP	100
CDR34BP512A---	5,100	F,J,K	BP	50
CDR34BP562A---	5,600	F,J,K	BP	50
CDR34BP622A---	6,200	F,J,K	BP	50
CDR34BP682A---	6,800	F,J,K	BP	50
CDR34BP752A---	7,500	F,J,K	BP	50
CDR34BP822A---	8,200	F,J,K	BP	50
CDR34BP912A---	9,100	F,J,K	BP	50
CDR34BP103A---	10,000	F,J,K	BP	50

Military Type Designation 1/	Capacitance in pF	Capacitance tolerance	Rated temperature and voltage-temperature limits	WVDC
CDR34 (BX)				
CDR34BX273B---	27,000	K,M	BX	100
CDR34BX333B---	33,000	K,M	BX	100
CDR34BX393B---	39,000	K,M	BX	100
CDR34BX473B---	47,000	K,M	BX	100
CDR34BX563B---	56,000	K,M	BX	100
CDR34BX104A---	100,000	K,M	BX	50
CDR34BX124A---	120,000	K,M	BX	50
CDR34BX154A---	150,000	K,M	BX	50
CDR34BX184A---	180,000	K,M	BX	50
CDR35 (BP)				
CDR35BP472B---	4,700	F,J,K	BP	100
CDR35BP512B---	5,100	F,J,K	BP	100
CDR35BP562B---	5,600	F,J,K	BP	100
CDR35BP622B---	6,200	F,J,K	BP	100
CDR35BP682B---	6,800	F,J,K	BP	100
CDR35BP752B---	7,500	F,J,K	BP	100
CDR35BP822B---	8,200	F,J,K	BP	100
CDR35BP912B---	9,100	F,J,K	BP	100
CDR35BP103B---	10,000	F,J,K	BP	100
CDR35BP113A---	11,000	F,J,K	BP	50
CDR35BP123A---	12,000	F,J,K	BP	50
CDR35BP133A---	13,000	F,J,K	BP	50
CDR35BP153A---	15,000	F,J,K	BP	50
CDR35BP163A---	16,000	F,J,K	BP	50
CDR35BP183A---	18,000	F,J,K	BP	50
CDR35BP203A---	20,000	F,J,K	BP	50
CDR35BP223A---	22,000	F,J,K	BP	50
CDR35 (BX)				
CDR35BX563B---	56,000	K,M	BX	100
CDR35BX683B---	68,000	K,M	BX	100
CDR35BX823B---	82,000	K,M	BX	100
CDR35BX104B---	100,000	K,M	BX	100
CDR35BX124B---	120,000	K,M	BX	100
CDR35BX154B---	150,000	K,M	BX	100
CDR35BX184A---	180,000	K,M	BX	50
CDR35BX224A---	220,000	K,M	BX	50
CDR35BX274A---	270,000	K,M	BX	50
CDR35BX334A---	330,000	K,M	BX	50
CDR35BX394A---	390,000	K,M	BX	50
CDR35BX474A---	470,000	K,M	BX	50

1/ The complete part number will include additional symbols to indicate capacitance tolerance, termination and failure rate level.

Application Information on MLC Chip Capacitors

Solder Pad Design for Surface Mount Chip Capacitors

Optimization of pad design requires a balance of all dimensions. The solder pad designs shown on this page are based on results of a systematic study of pad geometries and the practical experience of the AVX Applications Lab. The geometries shown take into consideration the placement accuracy of pick and place machines, and the geometric effects discussed below:

DRAWBRIDGING will occur when the overlap is much less than the extension dimension. (Notice that this is a function of the actual chip length.) DRAWBRIDGING will also occur when the extension is sufficient to provide contact of the termination and solder. In practice, this will be a function of pick and place accuracy. Notice that pad design is very constrained, especially for small chips, due to the above effects. Other variables that will contribute to DRAWBRIDGING are:

- Solder laydown too heavy
- Uneven heating of the solder pads
- Extreme thickness of chip capacitors

MISALIGNMENT during reflow (or sliding off axis) will occur when dimension L is larger than the chip size. This can also be affected by poor design of conductive paths.

OPENS, or pulling completely off a solder pad, will occur more frequently when dimension L is too small or when dimension S is too large.

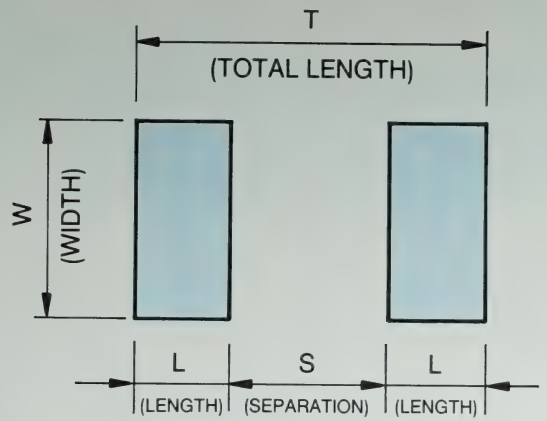
CTEs of Typical Components and Substrates

Material	CTE (ppm/°C)[1]
Alumina	7
Titanate Cap	9.5-11.5
FR-4 PC Boards	18
Polyimide/Glass PCB	12
Polyimide/Kevlar PCB	7
Copper Clad Invar	6-7
Copper	17.6
Tin/Lead Alloys	27

[1]Coefficient of Thermal Expansion

Application Information on MLC Chip Capacitors

Solder Pad Design for Surface Mount Chip Capacitors



Recommended Pad Dimensions

Chip Size	Dimensions (inches)			
	L	W	S	T
0504	0.035	0.050	0.020	0.090
0603	0.035	0.030	0.030	0.100
0508	0.035	0.080	0.020	0.090
0510	0.035	0.100	0.020	0.090
0612	0.035	0.120	0.030	0.100
0805	0.040	0.050	0.040	0.120
1005	0.040	0.050	0.060	0.140
0907	0.040	0.070	0.050	0.130
1206	0.040	0.065	0.080	0.160
1505**	0.040	0.050	0.110	0.190
1805**	0.040	0.050	0.130	0.210
1210	0.040	0.100	0.080	0.160
1808	0.050	0.080	0.130	0.230
1812**	0.050	0.120	0.130	0.230
1825**	0.050	0.250	0.130	0.230
2321**	0.050	0.210	0.180	0.280
2225**	0.050	0.250	0.170	0.270
3640**	0.060	0.400	0.300	0.420

**These sizes are recommended for use with IR and vapor phase soldering only in dielectrics X7R, Z5U, and Y5V.

Packaging of Chip Components
Automatic Insertion Packaging

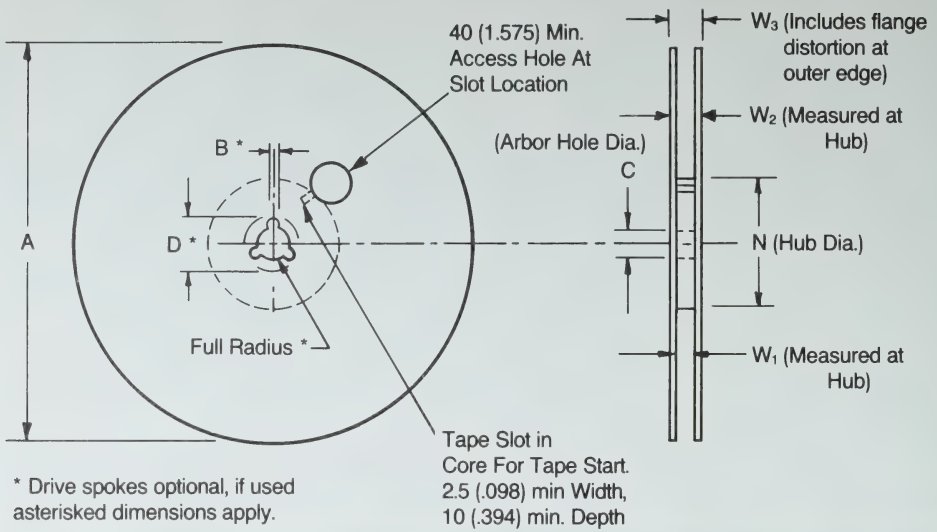
Tape & Reel Quantities*

All tape and reel specifications are in compliance with RS481.

Sizes	0603, 0805, 1206, 1210	1812, 1825, 2225
Embossed and Punched Carrier	8mm	12mm
Pieces/7" Reel(1)	2000 or 4000	1,000
Pieces/13" Reel(1)	10,000	4,000

(1) Dependent on chip thickness.
* For non-standard sizes consult factory.

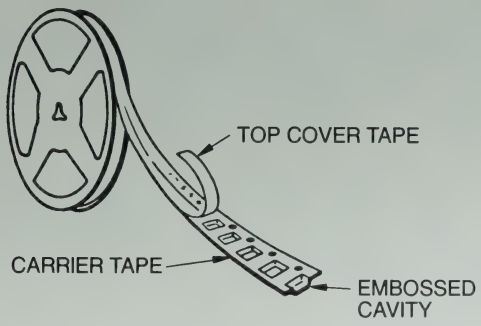
Reel Dimensions
Metric Dimensions Will Govern

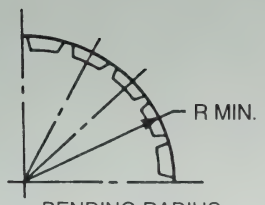


Tape Size(1)	A Max.	B* Min.	C	D* Min.	N Min.	W_1	W_2 Max.	W_3
8mm	330 (12.992)	1.5 (.059)	13.0±0.20 (.512±.008)	20.2 (.795)	50 (1.969)	$8.4^{+1.0}_{-0.0}$ ($.331^{+.060}_{-0.0}$)	14.4 (.567)	7.9 Min. (.311) 10.9 Max. (.429)
12 mm						$12.4^{+2.0}_{-0.0}$ ($.488^{+.076}_{-0.0}$)	18.4 (.724)	11.9 Min. (.469) 15.4 Max. (.607)

Metric dimensions will govern.
English measurements rounded and for reference only.
(1)For tape sizes 16mm and 24mm (used with chip size 3640) consult EIA RS-481 latest revision.

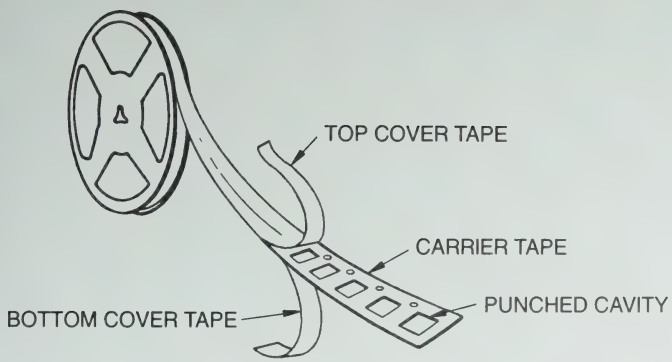
Embossed Carrier

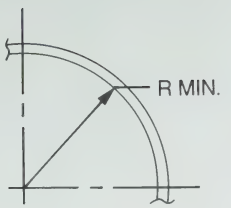




BENDING RADIUS
SEE NOTE 2
PAGE 42

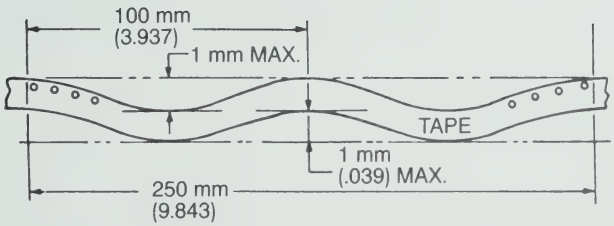
Punched Carrier





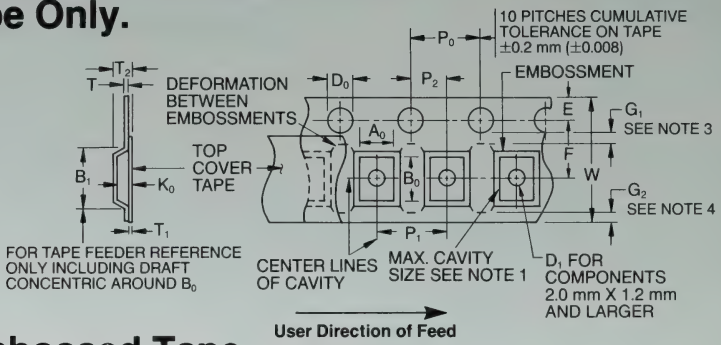
BENDING RADIUS
SEE NOTE 2, PAGE 43

Camber (Top View)



Allowable Camber To Be 1 mm / 100 mm Nonaccumulative Over 250 mm

Embossed Carrier Configuration
8 & 12 mm Tape Only.



8 & 12 mm Embossed Tape
Metric Dimensions Will Govern

Constant Dimensions

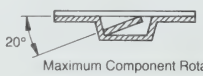
Tape Size	D_0	E	P_0	P_2	T Max.	T_1	G_1	G_2
8 mm and 12 mm	1.5 $^{+0.10}_{-0.0}$ (.059 $^{+.004}_{-.00}$)	1.75±0.10 (.069±.004)	4.0±0.10 (.157±.004)	2.0±0.05 (.079±.002)	0.600 (.024)	0.10 (.004) Max.	0.75 (.030) Min. See Note 3	0.75 (.030) Min. See Note 4

Variable Dimensions

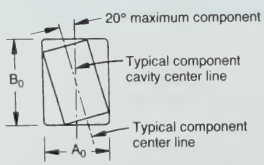
Tape Size	B_1 Max. See Note 6	D_1 Min. See Note 5	F	P_1	R Min. See Note 2	T_2	W	A_0 B_0 K_0
8 mm 1/2 Pitch	4.55 (.179)	1.0 (.039)	3.5±0.05 (.138±.002)	2.0±0.10 (.079±.004)	25 (.984)	2.5 Max. (.098)	8.0 $^{+0.3}_{-0.1}$ (.315 $^{+.012}_{-.004}$)	See Note 1
8 mm				4.0±0.10 (.157±.004)				
12 mm	8.2 (.323)	1.5 (.059)	5.5±0.05 (.217±.002)		30 (1.181)	6.5 Max. (.256)	12.0±.30 (.472±.012)	
12 mm Double Pitch				8.0±0.10 (.315±.004)				

NOTES:

1. A_0, B_0, and K_0 are determined by the max. dimensions to the ends of the terminals extending from the component body and/or the body dimensions of the component. The clearance between the ends of the terminals or body of the component to the sides and depth of the cavity (A_0, B_0, and K_0) must be within 0.05 mm (.002) min. and 0.50 mm (.020) max. The clearance allowed must also prevent rotation of the component within the cavity of not more than 20 degrees (see sketches C & D).
2. Tape with components shall pass around radius "R" without damage. The minimum trailer length (Note 2 Fig. 3) may require additional length to provide R min. for 12 mm embossed tape for reels with hub diameters approaching N min. (Table 4).
3. G_1 dimension is the flat area from the edge of the sprocket hole to either the outward deformation of the carrier tape between the embossed cavities or to the edge of the cavity whichever is less.
4. G_2 dimension is the flat area from the edge of the carrier tape opposite the sprocket holes to either the outward deformation of the carrier tape between the embossed cavity or to the edge of the cavity whichever is less.
5. The embossment hole location shall be measured from the sprocket hole controlling the location of the embossment. Dimensions of embossment location and hole location shall be applied independent of each other.
6. B_1 dimension is a reference dimension for tape feeder clearance only.



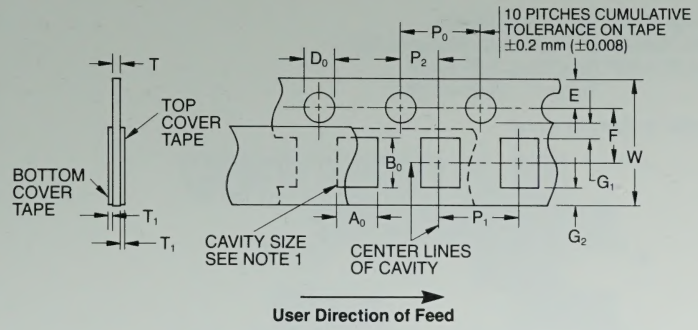
Side or Front Sectional View
Sketch "C"



Top View
Sketch "D"

AVX KYOCERA

Punched Carrier Configuration
8 & 12 mm Tape Only.



8 & 12 mm Punched Tape
Metric Dimensions Will Govern

Constant Dimensions

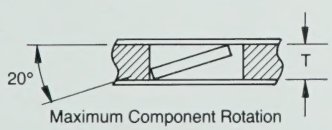
Tape Size	D_0	E	P_0	P_2	T_1	G_1	G_2	R MIN.
8 mm and 12 mm	1.5 $^{+0.1}_{-0.0}$ ($.059\ ^{+.004}_{-.000}$)	1.75±0.10 (.069±.004)	4.0±0.10 (.157±.004)	2.0±0.05 (.079±.002)	0.10 (.004) Max.	0.75 (.030) Min.	0.75 (.030) Min.	25 (.984) SEE NOTE 2

Variable Dimensions

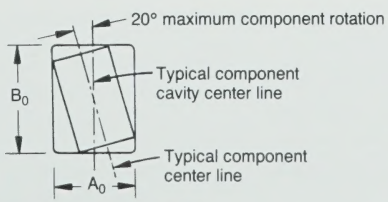
Tape Size	P_1	F	W	A_0 B_0	T
8 mm 1/2 Pitch	2.0±0.10 (.079±.004)	3.5±0.05 (.138±.002)	8.0 $^{+0.3}_{-0.1}$ ($.315\ ^{+.012}_{-.004}$)	See Note 1	1.1 mm (.043) Max. for Paper Base Tape and 1.6 mm (.063) Max. for Non-Paper Base Compositions.
8 mm	4.0±.010 (.157±.004)				
12 mm	4.0±0.10 (.157±.004)	5.5±0.05 (.217±.002)	12.0±0.3 (.472±.012)		
12 mm Double Pitch	8.0±0.10 (.315±.004)				

NOTES:

1. A_0, B_0, and T are determined by the max. dimensions to the ends of the terminals extending from the component body and/or the body dimensions of the component. The clearance between the ends of the terminals or body of the component to the sides and depth of the cavity (A_0, B_0, and T) must be within 0.05 mm (.002) min. and 0.50 mm (.020) max. The clearance allowed must also prevent rotation of the component within the cavity of not more than 20 degrees (see sketches A & B).
2. Tape with components shall pass around radius "R" without damage.



Side or Front Sectional View
Sketch "A"



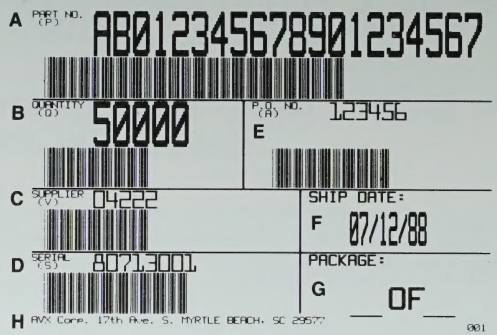
Top View
Sketch "B"

Bar Code Labeling Standards

AVX Kyocera bar code labeling will follow latest version of EIA RS-556.

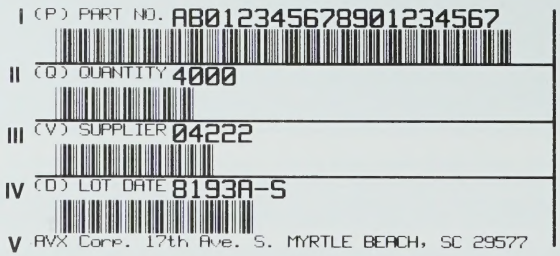
Symbology: Code 39
Density: External Label: 6.4 cpi Reel/Inner Pack: 7.0 cpi
Format: External Label: AIAG Reel/Inner Pack: AVX/Kyocera Std.
Label Size: External Label: 4.0″ × 6.5″ Reel/Bag: 1.8″ × 4.0″
Tube: 0.5″ × 4.0″

External Label Description (refer to sample label)



Description	Max. Chars.	Char. Type	Bar Coded	AIAG Data ID
A. Customer part number	20	Alphanumeric	Y	P
B. Quantity (pcs.) in shipping container	6	Numeric	Y	Q
C. Supplier number by which customer identifies AVX/Kyocera	7	Alphanumeric	Y	V
D. Package serial number	8	Numeric	Y	S
E. Customer purchase order number	11	Alphanumeric	Y	A
F. Date shipped	8	Text	N	
G. Package count	4	Text	N	
H. AVX/Kyocera facility address	48	Text	N	

Inner Pack Label Description (refer to sample label)



Description	Max. Chars.	Char. Type	Bar Coded	AIAG Data ID
I. Customer part number	20	Alphanumeric	Y	P
II. Quantity in inner pack	6	Numeric	Y	Q
III. Supplier number (see C above)	7	Alphanumeric	Y	V
IV. Date code/revision/single or multiple date codes	7	Numeric	Y	D
Note: Julian date or YYWW format available.				
V. Facility address	48	Text	N	



AVX CORPORATION

A KYOCERA GROUP COMPANY

Myrtle Beach, SC / Tel: 803-448-9411 / FAX: 803-448-1943
Vancouver, WA / Tel: 206-696-2840 / FAX: 206-695-5836
Olean, NY / Tel: 716-372-6611 / FAX: 716-372-6316
Raleigh, NC / Tel: 919-878-6200 / FAX: 919-878-6462
Biddeford, ME / Tel: 207-282-5111 / FAX: 207-283-1941
AVX Limited, Aldershot, England / Tel: 252-336868 / FAX: 252-346643
AVX, Hong Kong / Tel: 852-363-3303 / FAX: 852-765-8185

S-39210MMCCC-C